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ABSTRACT

Changes in higher education that affect teaching and research are addressed in the proceedings of the 1982 forum of the European Association for Institutional Research. In addition to six invited papers on adaptation or guidance of universities, papers on faculty, resources and cost indicators, research facilities and equipment, and institutional self-study and program assessment are presented. Abstracts of 10 additional contributed papers are also included. Titles and authors of papers include the following: "Higher Education and Research as Dynamics for the Development of Society" (Carl-Gustaf Andren); "Universities in a Changing World--Adaptation or Guidance?" (Bernard F. Sliger); "Changes in Faculty Characteristics, Activities, and Attitudes Over 25 Years at a Major United States University" (John E. Stecklein); "Faculty Profiles in a Long-Term and Comparative Perspective" (Urban Dahllof); "A Resource Requirements Prediction Model for the Central Administration Support Program in a University" (Franz Bingen, Carlos Siau); "A Model for Planning Systematic Replacement of Scientific Equipment" (John A. Muffo); "A Qualitative Model for Institutional Self-Study" (F. Craig Johnson); and "Statewide System for Assessment of Institutional Basic Skills Programs" (Madan Capoor, Edward Morante). (SW)

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The Universities in a Changing World
Adaptation or Guidance?

PROCEEDINGS

FOURTH EUROPEAN AIR FORUM

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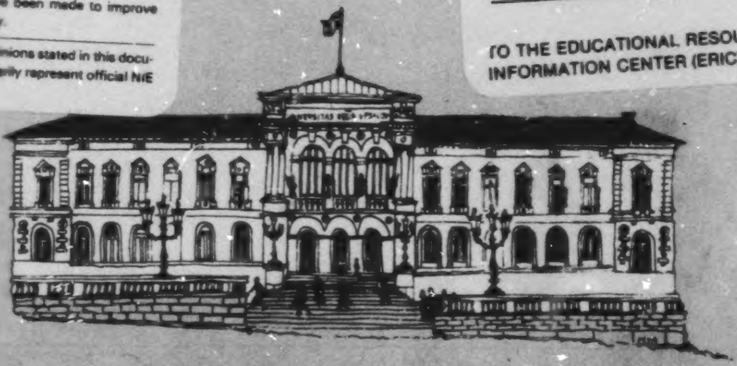

UPPSALA UNIVERSITY 25 - 27 August 1982

Association for Institutional Research

THE UNIVERSITIES IN A CHANGING WORLD
ADAPTATION OR GUIDANCE?

CHARLES H. BELANGER, EDITOR

4TH ANNUAL FORUM
EUROPEAN ASSOCIATION FOR INSTITUTIONAL RESEARCH
UPPSALA UNIVERSITY
SWEDEN

AUGUST 1982

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EUROPEAN ASSOCIATION FOR INSTITUTIONAL RESEARCH
UPPSALA UNIVERSITY, SWEDEN
AUGUST 25-27, 1982

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PREFACE AND ACKNOWLEDGEMENTS

This issue of the European Association for Institutional Research Proceedings would be very incomplete without giving heartfelt recognition to people who, not only made this 4th European Forum possible, but had enough drive and care to make it thrive. Special indebtedness is due to the Swedish Ministry of Education which encouraged and supported the holding of the Forum. The more than 500-year-old Uppsala University made its presence constantly felt through her dynamic and most hospitable president, Dr. Martin H:Son Holmdahl, also professor of anaesthesiology at his own eternally young Alma Mater Upsaliensis.

Special thanks must be directed to a seasoned soldier and an experienced strategist for never losing sight of the needs of the troops and the challenge lying ahead. Gunnar Wijkman, head of administration at Uppsala University, is the individual who long before his participation in the first European Forum in 1979, was convinced of the need for more factual information in the decision-making arena. On the eve of his retirement, we would like to emphasize the fact that his support to institutional research and planning has made a big difference. We all wish him the best.

To Thaly Nilsson, his Program Committee members, and his secretariat staff goes our deepest appreciation for their hospitality, their availability, and their efforts to make the Forum the success it was.

I would also like to acknowledge the professional work of my colleagues on the Contributed Papers Selection Committee. They were most helpful in providing me with their comments. Unfortunately, there was not enough space in these Proceedings to do justice to all deserving authors who presented quality papers. Our selection was mainly based on the following criteria: European relevance, significance of contribution, and overall content quality.

Finally, thanks to all participants.

Charles H. Bélanger

ANNUAL FORA ON INSTITUTIONAL RESEARCH

1979 - Institutional Research in North America and Europe, Paris, France

1980 - From Institutional Evaluation to Catastrophe Theory, London, England

1981 - The Pyramid of Decision and Other Approaches, Louvain-la-Neuve, Belgium

1982 - The Universities in a Changing World - Adaptation or Guidance, Uppsala, Sweden

1983 - The University as an Open System, Maastricht, The Netherlands, August 17-19

TABLE OF CONTENTS

INVITED PAPERS ON ADAPTATION OR GUIDANCE OF UNIVERSITIES

Welcoming Address to the Fourth European AIR Forum
Martin H:Son Holmdahl.. 1

Guidance and Adaptation in Higher Education and Research - Some Swedish Experience
Jan-Erik Wikström.. 5

Higher Education and Research as Dynamics for the Development of Society
Carl-Gustaf Andrén.. 9

Universities in a Changing World - Adaptation or Guidance?
Bernard F. Sliger.. 19

What is the Ultimate Basis for Decisions?
Gunnar Wijkman.. 29

The Changing Role of Universities
Stuart L. Smith.. 33

FACULTY PROFILES

Changes in Faculty Characteristics, Activities and Attitudes over 25 Years at a Major United States University
John E. Stecklein.. 39

Faculty Profiles in a Long-Term and Comparative Perspective
Urban Dahllöf.. 55

The Effect of Faculty Reputation in an Institutional Reward Structure: A Preliminary Analysis
Paul Carney.. 69

RESOURCES AND COST INDICATORS

A Resource Requirements Prediction Model for the Central Administration Support Program in a University
Franz Bingen and Carlos Siau.. 77

Presentation of Ten Cost Indicators in Terms of Hours of Activities
Francis Inghels.. 93

RESEARCH FACILITIES AND EQUIPMENT

A Model for Planning Systematic Replacement of Scientific Equipment
John A. Muffo 107

The Link between the Universities with Permanent Research Facilities and the University Colleges without Research Facilities
Bengt Lindstedt 117

INSTITUTIONAL SELF-STUDY AND PROGRAM ASSESSMENT

A Qualitative Model for Institutional Self-Study
F. Craig Johnson 129

Statewide System for Assessment of Institutional Basic Skills Programs
Madan Capoor and Edward Morante 139

ABSTRACTS OF ADDITIONAL CONTRIBUTED PAPERS

Conflicting Demands for Control of a University's Public Radio Station - Case Study
A. Nancy Avakian 153

Teacher Education at a Distance Designed for Members of the Caring Professions
Marianne Kjellman and John Davies 153

A Historical and Contemporary Examination of Pre-Existing Conditions Necessary for an Institution to be Successful in its Environment
Robert G. Cope 154

Changes in University Autonomy in Democratic Spain
Alberto Moncada 154

The Changing American Legal System and its Impact on American Universities
Stephen R. Hample 154

The Staff Presidency and Shared Authority: An Alternative Administrative Structure for a Comprehensive University
Richard A. Harnett and John Andes 155

A Methodological Approach to Selective Cutbacks
Charles H. Bélanger and Lise Tremblay 155

Internationalizing the Universities
Susan Opper 156

Small Management Information Systems for Small Institutions
John R. Calvert, D.W. Birch and Dudley Gibson 156

Present and Future Functions of Higher Education in Society
Peter Stenkula 156

WELCOMING ADDRESS TO THE FOURTH EUROPEAN AIR FORUM

Martin H:Son Holmdahl
President and Professor of Anaesthesiology
Uppsala University

On behalf of Uppsala University I wish you all welcome to this Fourth European Forum arranged by the Association for Institutional Research on the topic - Universities in a Changing World: Adaptation or Guidance?

Management of Institutions for higher education and research is in the 1980's exposed to other problems than in the 50's and 60's. In the first post-war decades there was a strong mandate for higher education and basic research and economic limits for growth scarcely existed. The problems for universities then were connected to rapid growth. There were a lack of housing facilities for students, too large classes with not always very competent teachers, and unstructured curricula especially in the less vocationally oriented fields of the humanities and social sciences.

New professions emerged and the technological evolution put more and more demands on a professional training. The formerly, often purely academic - except for in such fields as medicine and technology - undergraduate university studies had to become more vocationally oriented. At the same time, many fields which were considered as vocationally oriented in the past underwent a rapid expansion of knowledge and had to be more theoretically oriented and upgraded to postsecondary school level. One realized that progress, even in such fields, depended on identification of problems and their solving by research. This called for research-oriented teachers and affiliation to institutions with research organization. Even in the economic affluent decades of the 50's and 60's, the above mentioned new demands on institutions for higher education were, as you all know, difficult to solve. The inertia of these institutions coupled with pressing social and international problems resulted in the so-called student revolutions of the late 60's. These in turn enhanced the on-going reform work.

In many countries, including Sweden, committees for the restructuring of higher education were led by governmental officials from outside the universities. They mostly concentrated on solving problems for the undergraduate level; the solution was the following for many countries:

1. New institutions for higher education were established. New regional universities often with special regional profiles were expected to relieve the pressure on the former elite, that is, the universities, - by then the struggling mass - and give a more equitable geographical distribution of higher education that, in turn, was thought to improve recruitment of new social classes and of adult people in need of a second chance or retraining. Upgrading some vocational schools to college-level and adding some university courses to them, in some other countries, including my own, served the same purpose. In addition, these new institutions were meant to enhance the social, cultural and economic life of their regions.

   In some countries, a unitary system of post-upper-secondary-school level education was created; in others, one still preferred a binary system with separation of universities with research organization from more vocationally geared institutions, mostly without research organization such as Polytechnics, Gesamthochschulen, and Junior Colleges of different kinds. Whether one or the other system will improve co-operative planning and co-operation between institutions, especially in times of budgetary contractions, must certainly be elucidated and discussed.

2. The undergraduate curricula of the universities in many countries were more firmly organized in labour market oriented study lines and outside representatives of concerned professions brought into study programme committee.

3. Emphasis was put on pedagogic training of university teachers.

All these reforms were certainly well grounded. Their implementation in the 70's, however, was not without difficulties, partly due to decreasing financial resources.

In addition, the one-sided concentration on the problems of the undergraduate level has created difficulties in the universities for postgraduate education and research. New institutions, new subjects, new and more intensive teaching methods, new ambitious administrative routines for admission and registration of students and for the undergraduate teaching have diverted staff and economic resources from the postgraduate level and research to the undergraduate level. Due to heavy commitments in undergraduate teaching, some staff have completely lost contact, if they ever had some, with research. Positions - even in the universities - have been created purely for undergraduate instruction. This has created an unfortunate division between undergraduate teaching and research in many universities, with serious drawbacks for both levels.

The undergraduate teaching lacks the vitalizing contact with new knowledge, as many teachers have difficulties, especially when they grow older, to keep abreast of the frontier of knowledge, if they are not actively engaged in postgraduate education and research. The postgraduate level is also suffering, as incentives to go into research are not transmitted to the undergraduates. Marked separate responsibilities for different groups of staff also create different loyalties and thus unhealthy conflicts between boards responsible for undergraduate education (study programmes committees) and boards responsible for research planning and graduate education (faculty boards). In order to improve the situation, as many teachers as possible should have time for research.

The most pressing challenges for the management of universities are now to create the best possible environment and cost efficiency for research. There certainly still exist unsolved problems in the field of undergraduate teaching and they are not lessened by the present tendency in many western countries to decrease the per capita cost. But as already mentioned, university research has suffered in the 70's and must now get better attention.

In many countries especially in the 1970's, resources for R & D in sectorial authorities have increased considerably. The rate of expansion has been much higher than for universities and Research Councils, resulting in more public money currently being channelled outside the university system, even in countries without many separate special public research institutions. The question has been raised whether the resources for sectorial R & D are well used and whether sectorial research attains the necessary scientific standard.

Although a closer co-operation between universities and external R & D has been proposed, one must recognize the advantages and possible disadvantages involved in the idea. As a general rule it is probably justifiable to have the assignment of priorities to various research areas justified on intra-disciplinary as well as on sectorial grounds. This may help to decide a proper and flexible degree off ntake capacity for graduate studies. Such a co-operation can also promote the consciousness of the need in sectorial administration and industry of research and researchers. An increased labour market for researchers will in turn improve recruitment to graduate studies. Not only will this more quickly fill the ranks of university teachers with research graduates but also hopefully supply administrative agencies, business firms and interest organizations with staff trained in research. This will matter crucially if society's investments in research are going to bring about desired economic, social and cultural developments.

As to possible disadvantages I would like to stress that co-operation with external R & D must not be allowed to interfere with the evolution of methodology and the intra-disciplinary motivated research. Here departmental heads and boards and especially the faculty boards have an important duty to perform in setting a healthy balance between use of staff and graduate trainees in basic and applied research. This cannot be easily done, if only a small part of the research money from external sources is channelled to university research without special project contracts and solely for the purpose of strengthening the competence and number of staff in the base-organization of the university departments. Such unlabelled grants from sectorial authorities and industries in need of co-operation with the university for their R & D would guarantee the university a more flexible staff organization and competence, that in turn would be better prepared to handle effectively projects in basic as well as in applied research.

To build on universities for the creation of this competence, has the advantage of reaching a very broad and hopefully vital research organization which is always replenished with graduate students and which hopefully through good co-operation among departments can tackle multidisciplinary problems.

The questions are: Can university management create suitable conditions for such a co-operation and can university researchers learn to co-operate among themselves and with external contractors?

In a system with university research depending on external grants to a great deal, either from Research Councils or sectorial authorities, one must create better co-operation between boards of the faculties and the external research agencies. Too rapid fluctuations in the level of external grants must be avoided or else cared for by a very active common staff policy. Of what I have said so far it seems as if since the 70's the universities to a great extent have had to adapt to a rapidly changing world and missed the opportunities of initiative and guidance. One has, however, to remember that the relations beween universities and external society always has been a feedback system. Universities always have delivered educated and skilled people and with them directly or indirectly new discoveries, inventions, and changes into society, that in turn puts new demands back to universities. We have lived through a period with a marked stress on the influx pathway of the boon system. The time may have come again for more guidance.

Teaching, learning and research are in themselves progressive activities. The universities therefore are, by nature, open and progressive institutions even if they in periods have shown tendencies to stagnation and introspection. A university is at its best when students, teachers and society question and take an interest in existing accomplishments and when scholars set about taking up challenges, new theories and difficult unsolved problems. A university will always be judged by internationally valid measures of quality in education and research. In many areas, one is only capable of maintenance and surveillance of present knowledge, whereas in some at least one must try to push the frontiers of knowledge forward. Teaching - undergraduate and graduate - and basic research are the primary concerns of a university. An increased contact with public sectorial authorities, trade unions, and industry may improve and widen the basis for teaching as well as research in the university. Dangers of being preoccupied with more vocational teaching and with too much applied R & D must, however, be observed. Too vocationally oriented teaching may not give incentives for graduate studies and does not give a flexible base of knowledge with better usefulness on a rapidly changing labour market. One must also be aware of the risks of being overrun by projects in applied research of a short-range nature and by too much development work, that is better handled outside universities. With improved co-operative planning, universities could, however, provide a new basis for sectorial and industry research, especially the kind of a more long-range nature. Increased co-operation necessitates the building-up of new competence on the management level on both sides. If this can be done, prospects for young researchers and thus for the vitality of the university may improve and make the redeployment of human resources easier.

If universities can meet the challenges from a society more and more dependent on knowledge, they may defend and further strengthen their role as centers for research in all countries. I would like to end by quoting Steven Müller: "The future of America's higher learning will be determined not in Washington, nor in the capitals of our States, nor in the public information media, but only on the campuses. If we cannot help ourselves, no *deus ex machina* will preserve us. If one were to express the same quotation in a more negative way, it could read: We have mostly ourselves to blame for things going wrong!

Finally, I would like to thank the program and proposals reviewing committees of this conference. I wish prosperous discussions and rewarding days here in Uppsala. If the meeting gives you new ideas and encouragement for your future work, I am sure the organizers of this conference will feel very rewarded.

Once again, I welcome you all to my own 505 year old, but eternally young and vital Alma Mater Upsaliensis.

GUIDANCE AND ADAPTATION IN HIGHER EDUCATION AND RESEARCH - SOME SWEDISH EXPERIENCE

Jan-Erik Wikström
Sweden's Minister of Education and Cultural Affairs

I am glad to be able to welcome to Sweden a conference of such eminent representatives of various educational systems. I would like to start by wishing you success in the proceedings which are now about to begin. We politicians, not least, appreciate the importance of the part which you play in your various capacities of responsibility for educational planning or research into this field, even if we sometimes try to act as if we ourselves have a hand in things. Consequently, the experience you gain and the conclusions you arrive at during this conference are bound to have an important bearing on future educational planning at local and central levels in your various countries.

You have gathered here in Uppsala to discuss Universities in a Changing World. In many of the countries which you represent, the expression "a changing world" means at present that economic growth has been interrupted and that your various countries are trying, one way or another, to adjust their finances to the prevailing economic difficulties. This no doubt provides a realistic background to the present conference, because many countries have also found it necessary to cut down on higher education and research expenditure. This makes it more necessary than ever to ask questions about the future status of universities. Is the key word to be adaptation or guidance?

I have called this address Guidance and Adaptation. I would like to stress the "and", because I believe that most of the Swedish delegates here today would agree with me that Sweden has opted for a combination of both alternatives. Perhaps this is only logical in a country which has long been regarded as taking "the middle way".

In Sweden, as in many other countries, questions concerning the appropriate relationship of higher education and research to the community at large already began to be asked during the late 60s. The questions then asked have now become classical. Is society to control universities and educational planning so as to secure the adaptation of education and research to its own needs? Or will universities serve society better by developing education and research in accordance with their own scientific values and with a higher degree of autonomy?

Where higher education is concerned, our standpoint on these questions was defined in 1977 through the introduction of a thoroughgoing reform of our higher education system.

I take the liberty of assuming that the main features of our higher education reform are familiar to those here today. We have had several opportunities of describing the content of the reform in international contexts, and I shall therefore confine myself to those aspects of the reform relevant to the question of guidance or adaptation.

The reform gave higher education opportunities for guidance in a number of respects. Higher education became partly an instrument to be employed in efforts to reduce social and economic differences in our country. To this end, rules concerning access to higher education were introduced which made it possible to admit candidates without traditional educational backgrounds. People who had not previously had the opportunity of studying at university or college were to be given that opportunity now. Partly for this reason, it was also decided to decentralize higher education to a number of new localities in Sweden. These measures, combined with the previously established system of financial benefits for students, increased the possibilities of people gaining access to higher education regardless of social, geographical or financial impediments. To my mind it is obvious that this constituted both a long-term and short-term benefit to our country.

Another form of guidance is the emphasis we have placed on all higher education as critical training. Such training serves to counteract a stagnation of the development of society, once again a form of guidance.

But there is no denying that important parts of our new higher education system have also been adapted to the needs and demands of society. One of the important effects of the reform of higher education was to establish that all education must be vocational or vocationally oriented. This was already the case with traditional studies such as those taken by prospective physicians or teachers, but it was now stipulated that traditionally "liberal" studies should also be given a vocational focus. This part of the reform naturally gave rise to a vigorous debate. It was made difficult now for anybody to be the eternal student, studying different branches of the humanities year after year for the sole purpose of broadening his education. The stipulation of a vocational link can be said to imply that higher education has been made to adapt to the demands posed by contemporary society. One of the main tasks of the higher education system has become that of providing society with highly educated labour, in sufficient numbers and of sufficient quality.

The task of providing society with necessary labour also meant that the higher education system was made responsible for advanced in-service training and further training. As we all know, developments above all in electronics and information technology have greatly augmented the educational needs of the established workforce. We have taken it for granted that the higher education system must make its resources available and help to provide the education which is needed. Short-cycle courses, located and timed to suit the students, represent a direct adaptation of universities to the needs of society.

But it is not only as regards the communication of knowledge that an obvious process of social adaptation has taken place. Another prominent feature of our reform was the wider circle of people empowered to make decisions concerning educational content. In addition to representatives of teachers, students and university employees, various public interests are now also represented in decision-making bodies. These external representatives come from the social partners, local authorities and professional organizations.

I will very highly emphasize that the higher education system has to provide critical training, challenge accepted views and put things into perspective while at the same time have a vocational focus. Therefore, as a result of the link between higher education and research, teaching, while focusing on the requirements of the community at large, is kept in touch with the latest findings and with the ongoing discussion of ideas. In this way research findings are transmitted to working life.

Six months ago I introduced in the Swedish Parliament a comprehensive Bill on the future planning of research. This Bill touches on several aspects of the guidance and utilization of university research by society. The standpoints adopted in the Bill differ in some essential respects from the views generally expressed only a few years ago. At that time I often had to defend the involvement of universities in research projects undertaken jointly with enterprise. This research, it was argued, was not "free". Opinions have now changed, and no opposition was aroused by the reference I made in the Bill to the importance of university research resources also being available to external users. The various universities are in fact building up an organization to establish contacts between research and enterprise. This too, in my opinion, provides an example of both adaptation and guidance.

There is one point about the Bill which I would like to dwell on, namely the balance between basic and applied research. We have put more emphasis than previously on the immense importance of basic research, not only to the universities in the short term but also to the long-term development of society. The explanation for this, in my opinion, is a natural one.

Basic research has its own special character. Its purpose is to search for new knowledge and ideas without any particular application in mind. In the general debate on research, this very purpose has sometimes led to the conclusion that basic research does not share the social usefulness of other kinds of research. Conclusions of this kind can result, and have resulted in some cases, in basic research having to give precedence to applied research and development when research resources are being distributed between different fields. In my opinion this reflects a lack of knowledge concerning the relationship between basic research and other research and development work.

The knowledge and ideas generated by basic research are a source on which applied research and development work is constantly having to draw in order to stay alive. Thus the fact of basic research tackling problems whose solution at the time of their formulation has no apparent practical application does not mean that the knowledge gained will be useless in a broader and longer perspective. On the contrary, a very great proportion of such knowledge and ideas will be put to practical use sooner or later. The difficulty lies in predicting the knowledge which can result from the solution of a certain problem, and when, if at all, that knowledge will become practically useful. The history of science contains innumerable examples of findings which lacked importance during the lifetime of the scientist or scientists concerned, and whose potential did not become apparent until long afterwards. Even virtually random spin-off effects of basic research have subsequently shown a surprising capacity for profoundly transforming human conditions. I wish to emphasize here that basic research is gradually supplying us with new knowledge in various fields. When the various pieces of knowledge thus gained are joined together in new patterns, they can suddenly lead to considerable advances, for example in our understanding of the world around us, in the curing of disease, in the protection of our environment and in the manufacture of new products.

I feel, therefore, that it is immensely important to eliminate misunderstandings concerning the deficient social usefulness of basic research. It has an intrinsic cultural value, it is a necessary precondition of our ability to take part in and benefit from international research, and it constitutes one of the foundation stones of the future development of our country. Only by accepting its relationship with the unknown can we properly balance the need for such research against the need for research of another kind.

Applied research can assume a very different character, owing to the nature of the problems involved and close contact with users. This research is often multi- or interdisciplinary, which means that researchers with different scientific traditions have to learn to understand each other's languages and to interest themselves in new approaches. The focus of this research is determined in collaboration with a user and must be adapted to the user's problems and his need of input documentation for decision-making purposes. Research must therefore be guided, not only by intradisciplinary criteria, but also by efforts to perceive the user's problems and translate them into researchable assignments. Thus applied research makes special claims on the user's ability to analyse his problems together with researchers and to avail himself of research findings. Research has to be planned on a joint basis in order for its results to furnish a viable foundation for practical measures and decision-making.

To conclude I would like to touch briefly on our experiences from the reform of higher education implemented in 1977. For natural reasons it is yet too early to draw any conclusions regarding the consequences of the direction of research that we have established through the Bill on Research and Research Policy earlier this year.

Planning of the Swedish higher education system has rested on the principle that the institutions of higher education should give guidance to society at large within the areas of their specific competence of education and research. It is yet too early to decide how well this task has been fulfilled. We need more time before we can tell. It is however noteworthy that no one so far has claimed that the institutions of higher education lack the necessary competence to fill this function. If the higher education system would have adapted itself too much to the demands of various interest groups, I am convinced that voices would have been raised in protest, particularly among those who still have the totally autonomous university as an ideal.

It is easier to make judgments as to the adaptation of the higher education system to society at large. I am convinced that the delegates from Sweden are prepared to agree with me that we have had good experiences with the broadened representation in the different bodies of higher education. Furthermore we have had good experiences of the participation of representatives of various professional fields in the planning of education. After a somewhat slow start the new institutions of higher education are now fulfilling an important function and have in several regards turned out to be the regional asset they were intended to be.

On one point we have been forced to revise our original intentions. In several instances it has been necessary to adapt the rules of admission to changing realities. Since the higher education system in Sweden - like many other countries - now has to absorb a very high number of young people in a situation of relatively high youth unemployment we have increased the possibilities for younger applicants to enter higher education. This means that we have succeeded in increasing the total number of students while at the same time the possibilities for older applicants and applicants with untraditional educational background to enter the institutions have been reduced. Let me finally wish you good luck in your work during these days. I am convinced that the experience brought forward by our foreign friends will most certainly be beneficial to us in Sweden.

HIGHER EDUCATION AND RESEARCH AS DYNAMICS FOR THE DEVELOPMENT OF SOCIETY

Carl-Gustaf Andrén
Chancellor of the Swedish Universities

The importance of close relations between the universities (i.e. research and higher education) and the community at large is a question which has attracted growing attention ever since the close of the 1960s. Views concerning the "degree of intimacy" characterizing these relations have varied quite considerably. In about 1970, collaboration and close communication, particularly between research and enterprise, were considered dubious, something which ought preferably to be avoided. For the sake of their liberty and independence, universities should not become excessively embroiled with their surroundings, particularly in matters concerning finance and the direction of research.

This attitude has gradually been revised in the aftermath of the oil crisis and resultant economic decline. Growing emphasis has been placed on the societal benefits of research and higher education. Co-operation and close relations between universities and industry, and between universities and the public sector, have come to be invested with positive value. Demands for immediately useful and applicable research findings have become so insistent that some researchers are gravely concerned as to what will happen unlesst the position of long-range research is strengthened.

The positive and negative attitudes have both been primarily concerned with technology and scientific-medical research, and in some cases with certain branches of social-scientific research as well, whereas the humanities especially, and some social-scientific research, have hardly been affected by the debate at all, the reason of course being that interest in the results of research and education is often determined by the question of their productive usefulness. Assessments have thus been guided by industrial and economic considerations, with the result that a short-term perspective has predominated, especially in a period of economic decline.

Some Definitions

The heading of this talk includes four terms and concepts. As they constitute the foundation of the following account, I would like to start by attempting to define each of them. They are: dynamics, universities (a collective term for research and higher education), society and development.

Dynamics comes from the Greek 'dynamis', meaning force, power, strength. There are several derivatives of this word in everyday use, such as dynamite, dynamo and dynamics, plus the adjective dynamic. All of them refer to the exertion of some kind of force, though in various ways. Dynamite represents explosive force, mostly of a somewhat destructive kind, a dynamo generates power for bicycle lighting, and dynamics denotes the motive power within a process of development, whereby the expansive force of one component exerts a positive influence and stimulus on the others.

University - comprising research and higher education - comes from the Latin 'universitas', meaning whole. Originally this denoted the community comprising both professors or teachers and students in the early medieval universities, communities whose aim was to secure guarantees of liberties and of freedom from interference by external authorities and corporations in the surrounding community. Today the term university (or college) denotes the activities consisting of research, scientific work and development, and also of education conducted on a scientific work basis. The reform of Swedish higher education in 1977 made 'högskola' the name of organized post-secondary education necessarily based on scientific foundations or on the special cognitive development characterizing an individual field - the liberal arts, for example. In this context, a university is a higher education establishment with permanent research resource.

The wholeness really expressed by the term university underlines the fact that the central problems connected with these activities often transcend conventional boundaries and that organization into faculties etc. is of minor importance. This type of organization has evolved for practical reasons, but it is intended to serve the activities concerned. The present-day situation has resulted in the interdisciplinary aspect being highlighted more than ever, because research problems so often concern different parts of universities. Thus a realization of the possibility of boundary-transcending activities really amounts to a realization of the idea of the university.

Society is sometimes taken to denote the official organizational power structures in a country, in the form of authorities and steering, managing bodies at various levels, with or without political affiliations. This category, accordingly, is also taken to include general organizations and corporations, as well as administration. Terms such as 'authorities', 'organization' and 'bureaucracy' often represent the individual citizens conception of society.

But there is also a broader definition whereby, in addition to the things I have now enumerated, society is also taken to mean everything a country accommodates in the way of human activities. In this way it is also taken to include individuals/citizens, regardless of whether they belong to apparticular group, and it also includes activities of every kind. I shall be using the term 'society' in this comprehensive sense.

Consequently the contrast quite often encountered between university and society is rendered impossible and absurd. Universities are not apart from society, they are a part of it.

Development. One can arrive at a fair appreciation of this term by taking the two verbs 'develop' and 'envelop' as one's starting point. Develop stands for activity, expansion, initiative, change, improvement. Envelop expresses a conservative, preservative attitude passively enclosing that which already exists, just as an envelope is sealed round a letter. In the present economic situation, with crises prevailing in many quarters, development has come to be primarily associated with industrial and economic development and growth, i.e. continuous improvement for the sake of the individual citizen's economic and social benefits. When speaking of societal development, we tend less often to think in terms of cultural or personal development. Defence for economic and social development as the prime consideration is based on its being an essential prerequisite of the other two kinds. This, of course, presupposes definite values - values which have varied from one period to another. For present purposes, I want to try and view the concept of development subject to the inclusion of all the various aspects - economics, social security, culture, the individual - and on the assumption that societal development in a good sense of the term requires universal participation.

The Purpose of Research and Higher Education - Background and Contours

Historical developments in Sweden during the past few decades shed an interesting light on the value and importance which are today attached to research and higher education in the community. Post-war developments have been largely shaped by three major Government Commissions - one per decade - and the reforms which they generated.

The 1945 Universities Commission was set up, immediately after the Second World War, "to consolidate and enlarge the opportunities for academic seats of learning to make, within the spheres of higher education and scientific research, a contribution fully comparable with what is required and achieved in the foremost civilized nations". The object was to elevate Swedish research to an international standard, and in concrete terms this was reflected, among other things, by the action of the Government and the Parliament in establishing a number of new research appointments - mostly professorial chairs - and building up a structure of research councils.

By 1955 it was time for a new Commission - the 1955 Universities Commission - which was called upon to undertake a comprehensive and open-ended assessment of "the position of universities and colleges in the whole of present-day and future society". At the same time, this Commission was called upon to enlarge educational capacity "to a previously unforeseen extent", due regard of course being paid to the needs of the labour market. Hesitant references to a community relationship thus acquired closer definition and greater impact, the activities of universities and colleges being viewed in direct relation to the community and its needs. Indeed, the terms of reference for this Commission describe research as the motive force behind societal development. Universities and colleges are credited with a leading position in terms of capacity for achieving positive changes from the viewpoint both of the individual and of the community as a whole. And the Commission's deliberations resulted in a considerable augmentation of the number of appointments and of other institutional resources for research and for the improvement of education.

The third Commission - the 1968 Education Commission or U 68, as it came to be known - was appointed in the midst of the chaos entailed by the academic population explosion and the student revolt. It was perfectly clear to the authors of the Commission's terms of reference that "Today's education policy will affect the development of our society well into the next century". Among other things this resulted in a wider conception of higher education, together with total planning of post-secondary studies, the establishment of a number of new colleges for primarily educational purposes, and the establishment of general educational programmes focusing on wide sectors of vocational activity and employment.

These three Commissions/reforms, which were supplemented by a succession of inquiries concerning special topics, show how politicians became increasingly aware of the part played by research and higher education in the life and development of society. Within universities and colleges, there was generally less awareness of the leading role which these insitutions were capable of playing. The technical colleges occupied a special position because they had always been more directly linked with industry and enterprise.

The build-up of higher education prompted questions concerning the control and direction of its activities. What part was to be played by the community at large - the Government and the Parliament, enterprise and trade unions, national and local authorities, and individual persons - in determining the priorities and organization of university and college activities? What part should universities and colleges themselves play through their own governing bodies, through teachers/researchers and students? A great many things within universities and colleges had previously been centrally directed, and this form of control extended to minor details. The reform of higher education was an attempt to invest the individual higher education establishments with extensive autonomy, and decentralization became the order of the day.

The following were enumerated by the Government and the Parliament as belonging to the objectives of the new system of higher education in Sweden: links with working life, democratization, renewal and development, and internationalization. All of these objectives are directly related to the community at large. They are neutral in the sense that the higher education system can be both transmitter and receiver in the realization of their underlying intentions, and I would like to enlarge on this point by considering two objectives in detail.

The prime purpose of the linkage with working life can be said to be for a course of education to relate to a particular occupational sphere or a particular sector of working life. Education is to be designed in the light of vocational experience and is to receive impulses from working life, so that its content and organization will provide the student with the best possible preparation for his or her future activities. At the same time it is important for education itself to capture new intentions and tendencies, often under the influence of research results, and thus in its turn influence the shaping of vocational life, instead of merely adjusting to the latter. Thus there are opportunities of mutual influence.

Renewal and development are also required of authorities and agencies concerned with higher education, which are thus given a special opportunity of leading and influencing societal developments in various ways. It is important for research-related education to take the opportunity of pointing out an anticipated course of development which may radically transform the labour market to a greater or lesser extent. Developments in data processing are the stock example in this respect, and they also illustrate how difficult it can be for both education and enterprise to keep pace with research and to predict imminent developments.

The Higher Education Act, which governs the activities of universities and colleges in Sweden, pins down the purpose of higher education by means of various key words and concepts. In defining the tasks of the higher education system, it refers to knowledge and skills, capacity for critical appraisal, vocational preparation, personal development, internationalization and understanding for other countries. One of the general premises laid down is that all education must be based on scientific foundations. This provision irrevocably affirms the connection between research and higher education. It is from this connection that higher education derives its special character, and it is this connection that can enable the higher education system to occupy a governing position and constitute the dynamics of societal development.

The implications of the key words referred to above can be summed up in the general terms: competence and capacity. Competence consists in factual knowledge, skills and professional awareness. Capacity can be described as personal maturity, independence and international awareness. An education realizing the above ideals and thus conferring solid up-to-date competence combined with development of the student's personality will also create considerable preparedness for social participation.

The Higher Education Ordinance stipulates that education must cater for the needs of the community and individuals. Catering for the needs of the community implies adjustment to what can reasonably be regarded as society's demand for education, viewed of course from the vantage point of the labour market. On the other hand, it is the duty of the educational authorities to try to see which forms of education society will need in future, even though society itself today may not be altogether aware of those needs. Thus universities and colleges are very well placed, through the education which they arrange, to exert long-term influence on the development of society and to adopt an active position by means of forward-looking guidance. The only question is whether they exercise this opportunity.

The purpose of research as defined by the Higher Education Act is to gain additional knowledge and to provide a scientific foundation for education to build on. We know today that our knowledge has grown almost incomprehensibly during the past century, but at the same time we have to admit that we have only dispelled a fraction of life's mysteries. The painstaking business of acquiring new knowledge must never cease, and curiosity must always have the upper hand of uncertainty as to whether an inquiry is really a paying proposition and can be expected to produce results.

The systematic and methodical search for new knowledge and new ideas with no definite application in view is the essential focus of research. The leaps and bounds by which development sometimes appears to proceed are often the result of research work which has long been in progress in neighbouring fields. When the results are put together, they shed light on hitherto unsolved problems. Long-term research may sometimes appear devoid of real social relevance, but in a more long-term perspective it is clear that this type of basic research, in quest of completely new knowledge, is the foundation both of applied research and of development and is therefore quite indispensable to society.

Clearly, this very position of privilege enjoyed by universities and colleges as being active and well informed regarding the latest research findings makes them specially well equipped to exercise authoritative leadership. At the same time we have to recall that it is not primarily this kind of leading position that is aimed for in universities and colleges. Through their work, however, they themselves create a platform for action.

Research very often comes up with unexpected results whose ultimate effects cannot be foreseen at once. Buffer-time planning, therefore, is only feasible up to a point. A scientific discovery can suddenly cause far-reaching, radical changes. Research findings themselves can sometimes entail changes which are destined to have a profound effect on societal developments, whether we desire it or not. Research findings per se therefore preclude adjustment by the universities. The Lysenko affair in Soviet genetics is one example of the untenable situation which can result when a society attempts to disregard international research findings. Thus the purpose of both research and higher education incorporates a dynamics for social development.

Research Policy and Societal Development

Opportunities of actively influencing the development of society thus form part of the basic structure of research and higher education. This has been increasingly realized in recent years. Historically speaking, one can discern the influence exerted through the profound changes which research findings have brought about in society. Examples of this are readily apparent in the medical and technical-scientific fields. One could go on indefinitely about the consequences of electricity and telecommunications. Refrigeration techniques are another example. They can be traced back to the growth of knowledge in the 18th century, but it was not until the 1920s that they produced the prototypes of what is now a commonplace in many parts of the world and is doubtless considered indispensable by most people. Refrigeration techniques have not only revolutionized food conservation, they have also transformed our working situation and have been one of the factors liberating above all female labour for economic activity in the past few decades.

There are two interesting observations which can be made concerning these examples. First and foremost, when the original basic discoveries were made, there was neither awareness nor any real interest concerning their future effects. Furthermore, these discoveries have gradually prompted changes which have changed the course of societal development.

In many parts of the world today, guidelines are being laid down for the development of research and efforts are being made to define a more long-term and comprehensive national policy of research, while at the same time endeavouring to keep abreast of international research events. Planning is of course partly occasioned by the heavy economic inputs which research now demands, the aim being to make the best possible use of the personnel and other resources available. Planning is also concerned with trying to co-ordinate the research inputs and research resources of universities and colleges with inputs and resources in other sectors of society.

This year, in June, the Swedish Parliament passed a Government Research Policy Bill, the first of its kind in Swedish history. Standpoints concerning research policy invariably define priorities in terms of the content of the research fields on which attention should be concentrated. The priorities thus defined by the community are in turn based on valuation and assessments by the researching units and by agencies concerned with planning research. To a great extent, therefore, the background of these priorities is intradisciplinary. A certain amount of documentation also derives, for example, from the assessments made by industry and enterprise. An important part is also played by international experience and aspects.

Research policy is primarily concerned with defining the main fields on which the Government and the Parliament wish to concentrate and into which, accordingly, they wish to channel resources. On the other hand, nothing is said concerning the problems which research is to deal with. Thus the Government and the Parliament make funds available and the recipients decide the thrust of research activities within the field concerned. Activities, and the extent to which they have been appropriate, are not reported until later, and they are then viewed in relation to international developments.

In order to improve the documentation available to policy makers, efforts are made in Sweden to compile what are known as faculty programmes for the various faculties and their research. In addition to presenting current research, these programmes are meant to divide up the field of knowledge in terms of disciplines, problems and achievements. It is hoped that faculty programmes of this kind will be capable of developing into major instruments of both local and central planning.

In a period of prolonged economic difficulties, there have been strong demands for applied research which can rapidly produce innovations in enterprise and industry. The risk of basic - long-term - research having been insufficiently provided for is now being pointed out from many quarters. In both East and West, reference is now being made to the necessity of greater emphasis on basic research as a means of continuously generating new knowledge, the point being that applied research and development activities must constantly draw on the spring of new knowledge and ideas arising out of basic research in order to maintain their vitality.

Co-operation between universities and colleges and the surrounding community has gone from strength to strength, especially in technology and natural sciences. In many cases, industry and enterprise are investing considerable resources in applied R & D of their own. Sweden has now established official routines of research co-operation in order to facilitate the exchange between universities and colleges and industry, enterprise and the public sector. In this way it is hoped to contribute towards an augmentation of contacts and mutual stimulus and exchange of ideas, one means to this end being the establishment of associate professorships and contact researcher appointments.

Co-operation has also been developed within the public sector, above all in the social sciences. So far it has been less easy to find scope for research collaboration in the humanities and theological studies. At the same time, it is clear that questions concerning human conditions, cultural and historical perspectives and ideologies and beliefs are of general human significance and therefore have their appointed place in the development of society. Viewed in an economic perspective, their results are less visible and tangible than those emanating from technology and natural science, which often have a direct impact on production. But the importance of individual personal development to the community as a whole must not be underrated, and this is what makes it important for research concerning human conditions, equilibrium and life style to be included in the dialogue between universities and colleges and the community at large. This situational experience and private personal satisfaction of the individual are a vital ingredient of positive societal development.

The governing and planning bodies in society are strongly aware of the importance of research and education as an ingredient of positive social development. Special knowledge and experience are possessed by universities and colleges, and the feasibility of a socially stimulating research policy hinges on them. If they are to achieve the renewal which they can generate, their inherent dynamics must be released and allowed to stimulate developments.

Dynamics and Power Structures

Social stability and order are founded on a system of rules which at the same time defines the apportionment of decision-making powers. Most people regard organization and administration - within reasonable limits - as a necessary prerequisite of a workable community and of getting things done. The positive values of a legal system are beyond question. At the same time, a system of rules, complete with laws, regulations and ordinances, constitutes a conservative factor which can inhibit efforts to achieve renewal and development. The power structures evolving in a system of rules are thus in themselves both necessary means of development and potential obstacles to the same.

The distinctive feature of dynamic elements is that they are aimed at renewal and change which do not always fit in with the existing system and order of things. In many cases, therefore, there is an obvious tension between expansive dynamics and established order and activities. The formal pattern of decision making, with its abstractly motivated, logical distinction between different levels, agencies and categories, therefore, is not always immediately applicable to the real decision-making situation.

If activities at universities and colleges are genuinely to harness the dynamic forces generated by them, and if they are to exert influence on social developments, this will require considerable flexibility and a conscious determination to seize opportunities both internally and externally. Systems and organizations have formidable built-in obstacles. The very uniformity of the higher education system presents difficulties, owing to the highly disparate nature of its constituent parts. The long handling period elapsing, in most cases, between proposals and the making and implementation of decisions, due partly to the large number of different levels in the decision-making process, has been a decelerating influence. The delay between idea and accomplished reality seems too long and is very liable to exhaust enthusiasm. In the 1977 reform of higher education, an attempt was made to overcome this. Faster decision making has been made possible in some matters, but further decentralization is doubtless feasible.

For all intentions to the contrary, the present system is liable to become conservative and lead to a temporizing attitude towards efforts at renewal and change, not least in the presence of economic constraints. The comprehensive recruitment of decision-making bodies from among all interested parties is meant to ensure that questions are debated as knowledgeably and comprehensively as possible. In this way the various categories affected by decisions are assured of active influence. This, of course, is commendable. At the same time, a multilateral decision-making process of this kind can result in a territorial mentality which directly impedes the practical process of renewal. To stimulate and facilitate this process, therefore, efforts must be made to ensure that the existing power structure includes opportunities of acting relatively promptly on ideas and initiatives. Failing this, the people coming up with proposals and ideas will soon lose heart.

Organization and Individual

Boards, committees and other agencies are responsible for renewal and change and are entrusted by statute with the continuous analysis of problems. In character they are impersonal. In actual fact their capacity and competence depend entirely on the people included in them. We all know from experience how important it is on these occasions to get hold of the "right people, i.e. those whom we usually refer to as knowledgeable, full of ideas and suggestions, keen to work -

and dynamic. Most of us have doubtless been moved to remark, more than once, that something is sure to get done now that such and such a person is involved, or conversely that a particular group or committee cannot really be expected to get anywhere, because none of its members has any ideas or suggestions to offer.

This brings us to the individual and his importance within the organization. Dynamics is very much concerned with individuals. This is a matter of both knowledge and individual characteristics - abundance of ideas, preoccupations, practical ability, constructive energy and vitality and, not least, a generous dose of optimism and infectious enthusiasm. In an atmosphere and environment of this kind, renewal can emerge and dynamically motivate other people for substantial effort. Competent, capable people create the verve and keenness that produce results. Nor is their influence confined to their own sphere of activities; in many cases they also have an impact on the surrounding community.

Universities and colleges, having research and education as their principal tasks, have the latent ability to play a guiding and inspiring role in the life of the community, and it is therefore important that the forces active within them should be highly competent and capable. The aim must be for use to be made in these connections of talented persons in various fields and to give them an opportunity of developing their talents. These talents must comprise both genuine expert knowledge of a specialized field and good personal qualities and qualification such as sound judgment, independence and both critical and constructive acumen. If our educational establishments are blessed with people who have resources at their disposal and who have the knowledge and determination to do something, there will be every prospect of our universities and colleges being able to provide the dynamics of societal development and the renewal of society.

UNIVERSITIES IN A CHANGING WORLD - ADAPTATION OR GUIDANCE?

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The first American colleges attempted to duplicate the conditions of the colleges of the ancient universities of England and Western Europe, including Uppsala. Continuing the tradition of a classical liberal arts curriculum, early institutions were residential, and they upheld rules based on the customs of Cambridge and Oxford. The earliest established American colleges were Harvard (1650), William and Mary (1693), and Yale (1745). While the clergy was the leading force in the founding of these colonial colleges, the institutions were not founded solely for theological education.

> They (the Puritan founders) did not distinguish sharply between secular and theological learning and they believed that the collegiate education proper for a minister should be the same as for an educated layman. They expected that the early colleges would produce not only ministers but Christian gentlemen who would be civic leaders (Hofstadter, p. 2)

By the middle of the eighteenth century, the principles of the Enlightenment and ideas of toleration and religious liberalism began to permeate American educational philosophy. Princeton (1746) was the first college to advocate freedom of religion. This was due to the growth of religious diversity as well as being a means of obtaining needed funds. During this period, which included the establishment of Columbia (1755) and Brown (1764), there was a new tendency to introduce science and philosophy into the curriculum. Unlike the customs of Cambridge and Oxford, the new tendency was based on the influence of Scottish universities.

In 1785, the University of Georgia, the first state university, was founded in an effort to rescue the collegiate system from sectarianism. It was followed by the University of North Carolina (1789), the University of Tennessee (1794), and the University of Virginia (1800).

> . . . until the American Revolution, the concern of governments with public education was expressed only in terms of their linkage to the church, which controlled what educational structure that did exist. (Deighton, p. 380)

By mandate of the Tenth Amendment (1791) to the Constitution, the American government could no longer delegate responsibility for education to the church. Education was to be governed by the needs and resources of the states and the communities within the states. Hence, there was no single educational hierarchy, no uniform institution, or standards for those institutions.

In 1788, a Philadelphia physician by the name of Benjamin Rush who was a member of the Continental Congress and one of the signers of the Declaration of Independence, proposed that a Federal University be established.

Fighting against the classical curriculum of European tradition, Rush sought an emphasis on graduate instruction and research. While in principle his proposal was innovative and functional, he failed to indicate the nature of financial support that the government would be expected to provide, and he had no plan for either administration or control of the university. As suspected, his plan died and shortly thereafter he lost interest in his idea.

During the last decade of the eighteenth century, a similar idea was again proposed, this time for a National University to be located in Washington, D.C. Its establishment was supported by George Washington, Thomas Jefferson, James Madison, and John Quincy Adams through a request to the Congress of the United States. Unfortunately, the resolution was defeated after much congressional debate and no decision as to how to acquire the necessary funds to get the university started. The American public was against the founding of such an institution on the grounds that they would be taxed heavily in order to provide the funding and that ". . . it might become a center of secularism and irreligion." (Brubacher, p. 218) Consequently, the idea of a National University was also abandoned.

Thomas Jefferson was not to be discouraged by the defeat of the plan for a National University. In 1800, the University of Virginia was founded under his auspices. It was the first full-fledged state university, although "university" in the true sense of the word did not make its appearance in the United States until the founding of Johns Hopkins in 1876. By definition, "university" has come to connote "an educational institution of large size which affords instruction of an advanced nature in all the main branches of learning." (Brubacher, p. 139) And as Chancellor Andren said yesterday an institution having permanent research facilities.

The University of Virginia was completely public, modern, non-denominational, basically secular, republican, and capable of teaching advanced studies. As emigrants from New England moved westward and the Federal Government granted public lands for the purpose of establishing "universities", the University of Michigan became the leader of the West. It favored a centralized tax-supported state system of education. The growth of state institutions was due to the rapid expansion of the public school system at the secondary level. It was influenced by the European Enlightenment of the eighteenth century, encouraging the study of the natural sciences and humanitarianism, where it came to be believed that applied knowledge should be used to reform human institutions, and by the effects of both the American and the French Revolutions. State institutions offered the broadest possible courses of study and the broadest possible public services to their constituencies. They served the needs of contemporary society as well as providing for intensification of theoretical study.

The two major influences on the development of higher education in the nineteenth century were the passage of the Morrill Acts (1862 and 1890) and the spirit of Individualism which pervaded the United States during this period.

In the early part of the nineteenth century, there was a desire on the part of people to improve education. No longer satisfied with recitation and rote learning, they wanted more flexibility and rebelled against the rigid format and the absence of academic and intellectual freedom in the classroom. By the 1840's when the farmer had attained a political voice, agricultural education came to be regarded as a partial cure for the farmers' economic ills. Relief was provided in the form of the Morrill Act of 1862 which set the guidelines for the establishment of land-grant colleges.

> How shall we summarize the significance of the land-grant colleges? They were among the first institutions of learning in the United States to welcome applied science and the mechanic arts and to give these subjects a recognized place in the college curriculum. They fostered the emancipation of American higher education from a purely classical and formalistic tradition. . . Finally, these colleges stood preeminently for the principle, increasingly so important in the middle of the twentieth century, that every American citizen is entitled to receive some form of higher education. With the first state universities and municipal colleges, the early land-grant colleges represented the force of democracy working as almighty leaven in the world of American higher learning. (Brubacher, p. 64)

The first Morrill Act provided for federal aid to be given to agricultural and mechanical colleges. It revolutionized public higher education in that it was to be used as a preparation for work more than for "artful leisure or character formation" (Moos, p. 5); it brought military science onto college campuses; it brought discussion classes, experiments, field trips, and laboratories to higher education; and it opened up higher education to the industrial classes and women. The second Morrill Act provided for annual federal appropriations for these institutions and encouraged the state authorities to furnish similar financial aid. It also prohibited payment of funds to states that discriminated against blacks. As Engineering and Technology emerged as independent disciplines, private colleges became involved in this type of education also. When the Massachusetts Institute of Technology was founded in 1865, its raison d'être". . . combining as it did original research in applied science with the diffusion of popular knowledge, was probably the most important determinant in setting the pattern for mushrooming American technological schools of the later nineteenth century." (Brubacher, p. 62)

Meanwhile a new wave of academic reform was gaining force among the more traditional Ivy League schools. In the Yale Report of 1828, the Americal liberal-arts college defended its philosophy of laying a general foundation common to all the professions through a course in the liberal learning, after which students could go on to advanced training. In effect, it was an attempt to keep specialization out of undergraduate institutions. In 1837, Ralph Waldo Emerson, in his address at Harvard, entitled "The American Scholar", retaliated:

> Emerson made a strong plea for adapting education to the individual, rather than vice versa, and for developing a distinctively American intellectual culture, rather than tamely submitting to a prescribed curriculum derived from other lands and times. (Brubacher, p. 102)

Through its President, Charles William Eliot, Harvard developed an elective curriculum for the junior and senior years. It included: 1) freedom of choice in studies; 2) an opportunity to win distinction in special fields of study; and, most important 3) a system of discipline which imposed responsibility for learning on the individual. Reinformed by the industrial expansion that followed the Civil War, the new system led to a broadening of curriculum offerings, and motivation was transferred from teacher to student. This emphasis on self-reliance reflected the spirit of the time, and it flourished from 1870 until 1910.

The advent of the twentieth century brought several new developments to the realm of higher education in the United States. Among them were the standardization of entrance requirements for admission to college and the creation of the "Junior College". With the introduction of the elective system in the junior and senior years came the partition of colleges into upper and lower divisions. The Junior College acted solely as a lower division institution. In actuality, it served simply as an extension of the secondary school, but it had appeal for those students who wished to attend professional schools and for those students who might otherwise not continue their education at all. The Junior College was generally a "local" or "community" college. Its aim was to bring higher educational facilities geographically within the reach of the mass of people. Students could save money by attending classes close to home, and because "going to college" was a way to promote social mobility and because it was beginning to be recognized as such by an increasing number of people, the inception of the Junior College was a way to accommodate this increase.

There were new developments on the philosophical level as well. Two conflicting points of view dominated the early decades of the twentieth century -- "New Humanism" and "Experimentalism". The advocates of Experimentalism emphasized the cultivation of the natural and the spontaneous, insisting on the importance of psychology and personal development. They expressed an interest in the problems and activities of modern society and desired to assimilate new social and intellectual trends into the college curriculum. Agreeing that Aristotle, Plato, etc., were relevant for their times, Experimentalists felt that the study of their work was no longer applicable. In a world of greater political and social democracy and growing capitalism, they declared that cultural change was good and that there was a definite need for flexibility in America's institutions.

The advocates of the New Humanism, on the other hand, were defensive toward the implications of modern social and scientific theories, as formulated in Experimentalism. Seeking to revive the "genteel tradition" of learning, the New Humanists were social conservatives who wanted to restore the study of classical languages and literature as a means of disciplining the mind and morals of the nation's youth.

The most important name associated with this debate of discipline versus freedom was John Dewey. His philosophy of Progressive Education was an integral one. Fighting against the absolutism of the past, Dewey purported that man was a part of nature, that the mind should not be developed simply for its own sake, but should be used as a means to aid man in his adjustment to his environment, the reformation of social ills, and the betterment of society at large.

The effect of this social revolution on the academic world was illustrated by the new importance placed on guidance and planning on the part of teachers in order to prepare their students for the future:

> The point of all this discussion for the problem of freedom is that, although the interests and purposes of the student

> must be the starting point of the educational situation, nevertheless the educator has the responsibility for taking the future into account, for making intelligent plans, and for manipulating the objective conditions of instruction so that the student does not remain on the level of his first interests and purposes but proceeds to broader and more socially useful ones. (Butts, p. 319)

The premise that higher education should seek to serve actively the basic needs of American life was the dominant influence on curriculum development of the twentieth century. In the classroom, the teacher-centered lecture was replaced by small informal discussion groups. By having the students become responsible for their own learning, the "college library" took on a new significance. Written exams and grades also became linked to academics: journalism became an extension of writing classes; debating became an extension of speech and communication classes; and student government became an extension of history and government classes.

Following World War II, Congress passed the Serviceman's Readjustment Act of 1944. This piece of legislation, commonly known as the G.I. Bill, changed the basic concept of who was able to attend college in the United States from that time forth. By the amazing number of veterans who chose to take advantage of the opportunities provided by the bill, it became obvious that more of the nation's youth could profit from post-secondary education than was previously thought; by the same token, the "married student" became an accepted member of the academic community;

> And by their unprecedented enrollments and their demand for more pragmatic instruction, veterans forced higher education to re-examine its objectives, facilities, and methods toward adjusting to students outside the conventional mold (Morefield, Story: "The Remarkable G.I. Bill", American Education, p. 25. August - September, 1974)

President Truman answered this call for a re-examination of the whole system of higher education in 1947 when he created the Presidential Commission on Higher Education. Unfortunately, the report of the Commission aroused criticism for its failure to address specific needs.

From the late 1950's through the early '70's, however, the federal government assumed a principal role in the progress of higher education by providing funding for research at the graduate level, for the expansion of teaching facilities in the fields of science, mathematics, and modern foreign languages, for international study centers, and for vocational training. Grants for both teaching and research as well as loans and scholarships for students who would otherwise be unable to pursue postsecondary education were also provided. The Basic Educational Opportunity Grants and Title IX of the Education Amendments of 1972 gave students more freedom of choice in deciding which institution they wanted to attend in addition to protecting them against discriminatory practices on the part of university personnel.

While government intervention in the higher education system was at the time a welcomed financial relief, new tensions were created by the mid 1970's. The only solution seemed to be for colleges and universities to be in part self-governing. Derek Bok, the President of Harvard, described the stifling effects of excessive government regulation on educational institutions:

> "Because of the value of autonomy and diversity, there are obvious costs in attempting to influence universities through government rules. By limiting the discretion of university personnel, rules diminish initiative and experimentation. In addition, rules involve a transfer of authority from educational institutions to public officials. Since these officials have less experience in education matters, they are more likely to make mistakes, and the cost of the mistakes will be magnified enormously by the power of the federal government to affect almost the entire range of educational institutions. Because regulations must be reasonably uniform in nature, they also threaten to impinge upon the diversity of the system. It is almost impossible to draft a single set of rules, however plausible, that will fit the special circumstances of all the varied institutions that exist in this country." (from Legislated Learning, Arthur E. Wise, ed., University of California Press, 1975)

Since that time, and under the present Reagan administration, the federal government has delegated to states and local governments the authority to set many of their own standards. The administration, and particularly the Department of Education under the direction of Secretary Bell, have acknowledged the need for autonomy and flexibility in the educational system. Money is now appropriated to the states for discretionary use. This regulatory relief on the part of the federal government has as its goal:

> leaving intact the good that has been, and is being, accomplished, while removing those requirements and provisions that improperly interfere with local initiative and accountability. (Anderson, p. 5)

Philosophically, this relief is a positive response to Bok's plea for more freedom for educational institutions. As usual, however, there is a Catch-22; many students who attend postsecondary institutions are highly dependent on federal financial aid and many university programs have been able to exist only through grants and loans provided by the federal government in the legislation which was passed by Congress in the 1960's. Therefore, many questions remain: Where do we go from here? Will many of our nation's youth not be able to attain a college education because of lack of funds? Will private foundations and corporations seek a new, positive relationship with the academic community for the benefit of both parties? What will be the role of the university in a world where change is the guiding factor?

Adaptation and/or Guidance

The interdependence of universities and the federal government, the former rendering public service and the latter supplying the capital for such services, has caused universities to become extentions of the federal bureaucracy.

In 1974, university administrators were warned that "Federal support may increase, but such funds will not be unrestricted. Federal strings, to pressure schools to meet federally sponsored goals, may be more desirable than pressure to meet state goals, but not much better." (Richman and Farmer, p. 291). The probability that universities would have to compromise their goals in order to comply with their major financial backers also loomed threateningly.

By 1976, support for higher education had become a routine function of the national government (Moynihan, p. 39). Environmental issues and energy conservation superseded the educational dilemma. In 1880, a Higher Education Reauthorization Bill extended all of the existing programs, but initiated little or no significant change in policy. Representatives from major universities were afraid to speak up, lest their own programs be cut if they were to oppose federal regulations.

While there is general agreement that a standardized national policy toward higher education should be established, there are four areas of concern regarding federal regulations that have been clearly delineated. They are: (1) the burdens of regulation, entailing the cost of staff, paper work, duplication of effort, and time demands to fulfill the information requirements of the federal government; (2) overlapping jurisdictions, requiring that institutions of higher learning retain qualified legal personnel to work with various federal enforcement agencies which are concomitantly responsible for the enactment of social legislation; (3) directional influences, including the academic and economic intrusion on the part of the federal government due to the imposition of regulations; and (4) regulation writing, being done by politicians, not by educators, and adherence to which is judged on files of information dealing with affirmative action and discrimination rather than the overall performance of the individuals involved. Unfortunately, the fact that universities and colleges are dependent upon federal support for their very survival retards progress toward a solution. Regulation reform is necessary, but in order to effect changes, university administrators must become involved in the process (Bender).

The basic problem with federal regulations is that academic communities are being evaluated in bureaucratic terms. An increase in the amount of paper work to be submitted on the part of institutions to satisfy government reporting procedures is taking away from precious teaching time, from individual counselling of students, and from those intangible ideals upon which universities were founded. We can ask ourselves why university administrators did not speak up sooner to defend their position, but the fact is that they didn't, and if they do not adapt to centralized standards formulated by the federal government, they may lose what federal support they have.

There are some possible alternatives. One is partial decentralization of the academic system. By granting local autonomy in decisions which "include appointment and promotion of faculty members and administrators, choice of courses and their content, awarding of degrees, choice of research projects, enforcement of policies on free speech and assembly, and admission of students within general guidelines established by systemwide or statewide agencies" (Mortimer, p. 233), the federal government can aid in upholding the principle of diversity and individuality for which our public institutions are respected.

Another alternative is to have universities work more closely with private industry. In this way, academic institutions can apprise themselves of the intricacies of the business world while rendering public service in the way they know best, providing an education to the American citizenry. The use of "telecourses," for example, exposes the traditionally closed classroom to the marketplace, where the public can see and judge college curricula and college faculties (Cross, pp. 9-10). By employing flexibility and creativity in the design of courses, universities can cater to people in the business community who seek to assume larger responsibilities in their corporations through knowledge of new products. Representing a significant resource for teaching, research, and employee development activities, universities have much to offer (Settle, p. 3). Co-operation with industry would save duplication of programs and hence the expenditure of unwarranted dollars at a time when financial costs impede the learning process for millions of people.

Regardless of these alternatives, it will be necessary for institutions of higher learning to maintain their basic integrity. Their mission is to provide a quality product, which must not be corrupted by a rapidly changing society or the influence of the federal government.

Neutrality

The conviction that the mission of institutions of higher learning is not to be influenced by societal changes or governmental influence is not new. The Declaration of 1915 formally announced the principal tenets of academic freedom. Proclaiming that institutions of higher learning were to remain neutral in the face of political, economic, and social issues, the document was originally written to protect institutions from conservative trustees and compliant university presidents. Later, it grew to imply a form of social contract. Specifically, it sought to maintain freedom of expression for professors, which could not be guaranteed if a university espoused explicit social or ideological views.

Derek Bok, the President of Harvard University, has recently had published his book entitled Beyond the Ivory Tower: Social Responsibilities of the Modern University, in which he explores in great detail the philosophy of neutrality, and the reasons for which he supports it, on the part of today's universities. One essential component in academic freedom is the selection of faculty, which he says must be done on academic merit and intellectual competence, rather than race, sex, or ideology. In this context, he does not agree with the concept of "preferential faculty hiring". He says:

> In the last analysis, the function of the university is not to define and enforce proper moral and political standards for the society. It has not been asked to assume this role nor does it have the power to carry it out effectively. The function of the University is to engage in teaching and research of the highest attainable quality. (p. 35)

Another basis for academic freedom is institutional autonomy. Government rules must not impress rigidity on a system that thrives on flexibility. Teaching and research do not flourish under imposed direction. Procedural requirements and threats of rescinding funds because of a lack of adherence to certain standards should not be applied to academic institutions. Diversity is the cornerstone of our universities. Bok uses many examples from scientific research to illustrate this point. While the government is a principal source of research funds and he grants that individual professors have the right to decide if they want to pursue certain research goals, Bok declares that scientists do not have unrestricted rights to search for truth through techniques that invade privacy or threaten life and good health. He believes it is the duty of the institution to consider the social consequences of the projects it chooses to support. He also warns us that while industry and academe can work toward mutually beneficial goals, there is the ever-present danger that the lure of quick financial rewards from the corporate structure may inhibit scholarly independence and the principle of pure scientific research.

In order to defend the doctrine of neutrality, university administrators must not use their university for particular ideological goals, and they must refrain from imposing their private political views on their institution. While he encourages individual students and faculty members to speak out for what they believe is right or to condemn injustice, he believes that the university as a collective body should not issue official statements on political questions. He emphasizes the need to study the long-range consequences of any action taken by the university and insists that we must always take our own needs into consideration, for the students will graduate and the world situation will change, but the institution will remain and we have a reputation to uphold. In a form of apology, he states:

> This policy may seem excessively cautious and self-protective exhibiting too little concern for the struggles and sufferings of others. In the long run, however, universities will doubtless accomplish more by concentrating on their traditional functions. As a practical matter, faculties are much more likely to do good work that has real value for others by expressing themselves through teaching and research. An academic institution has no special advantage in making collective political judgments on controversial issues, and its power as a shareholder, purchaser, or institutional critic is so slight that efforts to influence society by these means will usually have little chance of achieving any results whatsoever. (p. 304)

What President Bok is proposing in essence is that institutions of higher learning concern themselves with the stuff of education. To this end, he suggests that it is vital to include problem-oriented courses in curricula in order to develop a moral philosophy in today's students. Such courses, based on discussion, rather than lectures, are valuable in that they encourage students to perceive ethical issues, identify arguments, evaluate differing points of view, and arrive at reasoned conclusions. For,

> In the last analysis, an important part of becoming an educated person is to comprehend the fundamental problems of human existence in all their complexity and thus engage with life at the highest possible level of awareness. (p. 131)

Let me conclude by making a plea for the case of guidance. As Kvarnstrom and Norman say:

> The Universities must try to win back their former leadership, influencing not only the development of their own fields but of society as a whole. In order to be able to do that it is necessary, however, to open the "ivory tower" to society and to accept that priorities are given from the inside and from the outside.

Using Bok's word, to the outside world we should remain "neutral". We should not allow ourselves to become bureaucratic puppets. Universities should refuse to take on certain projects, even if it means forgoing funds. Our faculty should be active and aware in a scholarly manner. Basic research with minimal encumbrances should be provided by all levels of activity (federal, state, and sectorial). We can prepare our students to cope with a changing world by making opportunities available to them and by encouraging them to participate in the changing world as responsible citizens.

I close by paraphrasing what Mincater Weshtrom said yesterday -- "No one has said that Universities are not capable of guidance."

WHAT IS THE ULTIMATE BASIS FOR DECISIONS?

Gunnar Wijkman
Head of Administration
Uppsala University

My intention at this AIR Forum is to pinpoint a few problems from the floor.

A couple of weeks ago we had a reception for American students at the university. Suddenly I discovered that one of the participants followed me like a shadow. I said "How do you do" to my assiduous friend. Probably he found my behaviour such that an explanation of his constant presence would be appropriate. He excused his behaviour by saying that he had never believed himself to come as close to a vice-president as then. At home - as he expressed himself - a person like me is so high up that he is always to be found somewhere among the clouds, both invisible and unapproachable. But yet indispensable, he hastened to add.

My reflection afterwards - besides the satisfaction of having made somebody happy through my mere presence, something that is not always the case, indeed - was that now I understood why people at the universities on the other side of the Ocean are so interested in theories about administration and organization. You need some sort of a rocket to get through the clouds to those who are in power. Certainly it is like the Australian Nobel Prize winner, Patrick White, said - that living without an organization is like living in a high house without a floor.

An expression for this can also be what a professor emigrating from the U.S. to Sweden avowed as the main reason for coming here. He left a relatively well edified research environment and had to start here more or less from scratch. But in Sweden there were - according to him - first of all a few systems to obtain resources and the routines were such that assistance was demanded. And furthermore, you knew the research collective that appraised your qualifications.

What my friend gave utterance to applies very generally to a university organization and, of course, also when resources reach the university level. There must, of course, be ramifications for the further distribution of them. What you relatively generally may say about these resources is that there is no major risk of a flood. Somewhat simplified, you might venture to say that research and teaching have that in common with administration that the categories spend what they get and frequently think they have got too little.

What is there to support, then? Well, an organization which itself contains a lot of individualists, who are of the opinion that their specific demands are to be satisfied in the first place. Furthermore, their mood generally reflects the effectiveness of the departments and, let me call them, the producing units.

If the productivity is not high at this level, the university has not succeeded. It is the leading task for the university managers to try, by active administration, to optimize the result of its activity, independent of fluctuations in the economic situation. The theoretical methods and models to reach so far are many and well-known to this audience, but they demand in their application practical elements from mere technique to psychological behaviour. According to my opinion, the form of cooperation ought to be the normal drug. Let me illustrate that by referring to the experience gained from introducing faculty boards.

Our faculties had grown and became, according to investigators, too large to be able to function as decision-making units. Therefore, they were replaced by boards so that an effective and rational decision-making body would be obtained. At that time, the reform was received with great satisfaction, partly because even the giving of priorities could take place more or less entirely within the frame of the faculty. The bodies have become competent to make decisions. An expression, or perhaps a joke, I have heard in the U.K. - that if you don't want to have a decision, forward the matter to the faculties - is not valid here.

During the first two years after the reform, a considerable relief of the administration was noticed. Controversial issues became fewer and fewer.

But recently, a change could be noticed. Those who do not, in their own opinion, get their wishes sufficiently observed in the faculty boards complain to the administration The faculty board is considered to be far too anonymous. You search in vain for a person you can influence, and then you turn to the administration for help, in the first place, but also to get an explanation and seek advice how to handle the matter perhaps one more time.

This can be said to be a surviving reaction from the time when all heads of departments participated in the faculty meetings. Even if you didn't get it your way, you had yourself to blame or at least you knew who had gone against you, and in most cases you were informed about the reasons.

My conclusion from what I have said is that in an organization like a university with its specific structure, where you have to rely on the capacity of qualified individuals, cooperation must be accentuated, chiefly by bringing about a spirit of community to the task and a feeling that there is a value in what you do and a possibility - within certain limits - to influence your own situation.

Because of that you must try to establish as short ways of decision as possible within a university, so that the feeling of sharing the responsibility can be maintained. Here the administration has a central role, and perhaps because of that it has got a bad reputation for maintaining both individualism and cooperation is not an easy task. Another reason may be that administration implies a judgement of the demand for the basis of a decision. It need not each time be founded in the same way. If you have a coming man there is no need for so much basic data for the most help possible to be rendered. It is, then, much a question of taking risks. Without that it is difficult to be able to bring about any kind of development in due time. On other occasions there is need for more detailed data for a decision.

That was the case when I started to work in the so-called administration. My principal task was then to render things more effective in the public administration. It surprises me today that I had the patience to make myself acqainted with all operating details. But you soon learnt what a devastating weapon knowledge about the process was at the discussion about its design and about the need of personnel for its execution.

This experience was gained so long a time ago that time studies were permitted also in offices. After having tried to facilitate a working process as much as possible, by frequently using the small words and Kippling's friends -

why, when and how, the moment had, according to the rules, come for measuring work by time studies. When I had made my first time study and after special application had got a promise to make it over again, I was seriously thinking of handing in my resignation from the job. My second result turned out to be the same as the previous one, and it didn't correspond with reality. By using the greatest possible additions permitted for the personnel's own discretion, the result gave that only one third of those so hard working persons were needed to execute the set task. Then I was confronted with perhaps my first administrative problem. What was possible to achieve? I knew that we were over-staffed and by how much, but what was reasonable to demand. I showed that 40% of the staff were not needed.

Well, after this little digression, what am I missing from the time studies? Unfortunately, I must say, most of its ingredients but not its stop-watch. It was an effective instrument to obtain knowledge about working methods and volumes of work and furthermore, which was essential enough, the purpose and result of the work. The need for accuracy was adjusted to the need for contributions.

I think that it is characteristic for university administrators that we have very likely too little knowledge about the processes themselves. Far too willingly we yield to statistical returns, calculated figures and comparisons, and by means of comparative studies we try to form an opinion of how high the effectiveness is.

One may ask oneself if our present methods are sufficient. In my opinion, so is not the case, specially in times with unchanged or less resources. Now we are really facing realities. If you intend not only to preserve but also to develop and improve, then the need for detailed knowledge about what is actually required for the running of an activity makes itself strongly felt. In connection with reductions the argumentation from those "struck" is naturally hard and devoted. We generally remove the cream of the activity. To be able to counter-argue you must have knowledge about the whole contents of the basket. But here it must be emphatically stressed that the savings we are constrained to make here in our country are of limited proportions. So far we are probably well favoured compared to many other countries. But as well, from what has happened, I have at least come to the conclusion that even with our very centralized university system, it should yet be a matter for the universities to carry through the savings after the very general guiding principles given by the controlling authorities. In that connection I specially want to stress general guiding principles, so that a real situation of choice may exist at the university level. The task is by no means enviable, but it has to be performed. If you want to have strong universities, they must take their responsibility also in hard times. Naturally, there will arise severe conflict situations that have to be attacked. Yet this is better than to shirk one's responsibility and let somebody else carry out the painful operation. If the problem may be satisfactorily solved, this should be very constructive for the future co-operation. The general and open account that is called for in these situations improves the knowledge at the departmental level about the activity of the university, and about the policy it pursues. The procedure demands, of course, that when the trend has changed and the resources increase, the university shall be the one allowed to decide about the allocation of the additional resources, after general guiding principles.

What is striking when savings are to be carried out, is that these entirely shall hit the extent of the activity. It is rare that any direct rationalization measures are proposed, which could contribute to reducing the activity in a less painful way. Why it turns out that way, I think, depends on poor knowledge about the total activity. And we shall not forget our employment security.

We must in the planning for savings include an effective rationalization of the activity. At our university, we have through an intensified co-operation with the faculties and their administration succeeded in starting up such a process. Difficulties still remain.

We have during the last three years tried to make the departments more interested in their allocation of resources by letting them give annual reports, even including rough descriptions about the results. I see in this a beginning of a continuing rationalization activity. By creating a consciousness of costs and results, the basis of this has been made. It is a slow process that demands a good co-operation and efforts at different levels. You can improve the procedure by e.g. using the best of the time and measurement methods. Today we have too much of statistics and too little knowledge about performances.

Facing my retirement in a year's time, it is simple for me to put forward naughty proposals. But what is unpopular for the moment can be of great use in the long run.

THE CHANGING ROLE OF UNIVERSITIES

Stuart L. Smith
Chairman
Science Council of Canada

There was a time when universities existed to serve the interests of a particular class in society. By improving that class, they may well have served the interests of the general public but when that occurred, it did so as a by-product of the intended activity.

To see the serving of the public interest as the primary purpose of the existence of universities has been recommended on occasion over the years, more so nowadays, and usually causes fears and complaints in universities around the world. Demands of industry and government, very much in tune with the desires of the public, are for trained personnel and applicable research. Faced with these demands, universities frequently adopt one of two positions: they grumble and accede to them, within limits, or they grumble and resist them, within limits. Either way, there is the fear of losing academic freedom and being deflected by immediate preferences from their real longer term purpose. Either way, they are reacting to pressures generated by planners and policy makers external to the universities. This reactive mode, this understandable defensive posture, I contend, impedes the universities from enjoying a much more creative and fulfilling role, namely that of leadership.

The traditional purposes of universities - to search for truth; to discover, store, teach and disseminate knowledge; and to be critics of society - are as valid today as they have ever been and are certainly in the public interest. The modern university, however, can serve that interest in a great variety of ways, derived from its primary focus on knowledge and learning.

Take, for instance, the relationships between universities and the commercial interests of industry. A present focus of controversy is the gold rush to develop biotechnology and the resulting scramble by industry to sign up academic researchers. I won't be the first to point out, however, that the commercial exploitation of genetic manipulation differs from more familiar branches of technology mainly in the speed with which a bright idea might be translated into an extremely profitable, patentable invention. This is not a new dilemma -- it is a difference in degree, not in principle.

Admittedly, where many millions of dollars are at stake on overnight discoveries, and where people refuse to admit students or even talk to each other, it might be better for the campus to leave such activities in industrial labs. Such situations, though, are truly exceptional and, even then, might lend themselves to innovative solutions such as the rental of space or teaching services by the industry at the university or vice versa. Both arrangements exist in Canada at the moment.

In fact the industry/university boundary has been crossed with notable frequency. The practice of faculty members serving as consultants to industry is well established, particularly in chemistry and engineering, and it has not adversely affected research in any obvious way. The exploitation of university innovations by industry are by no means unprecedented, nor are they unwelcome. An industrial liaison programme at Massachusetts Institute of Technology, begun after the First World War, involves 186 member firms today. For a flat fee, a company gets a window on advanced technology under development in MIT's Laboratories as well as advice from its staff. In return students gain access to a wide variety of corporate R and D problems.

At Montreal's McGill University, an Office of Industrial Research has been giving service for a decade. They find potential clients with problems, put them in touch with McGill Faculty Members who can help, and they assist in negotiation of a contract between the two. Over 600 research projects have been handled in this way, helping McGill to develop strong research teams. Many other schools have similar arrangements, and consultants are now appearing to help in this brokerage role. In the UK, universities are scrambling to offer their expertise to industry. At a time when funding for these institutions is at a very low ebb, co-operation with industry offers one way out of the difficulty. For instance, two drug companies are helping University College in London out of a financial hole and, in the process, they may help turn it into a very strong centre of biotechnology research.

In a Canadian experiment in Waterloo, Ontario, a $4 million Institute for Computer Research on the campus will mark the first step in the development of a large-scale high-technology industrial park, on university-owned adjacent land. The University is selling "corporate partnerships" in its newly created Institute. For a $250,000 contribution to the Institute's operating costs, companies will be provided with offices in the facility, have access to the University's technical expertise, a seat on the Institute's advisory board and will also receive first opportunity to recruit university graduates.

It would be simplistic to intimate that there are not some very complex problems associated with this sort of co-operation. But, there is a real danger in a strictly reactive, reluctant response. That danger is that universities will be *bypassed* and greatly *diminished* in importance. Exciting research is going on in industry. They are at the cutting edge intellectually, are better equipped and are impatient. Students will want to be where the *action* is and universities may well be *left behind* unless novel arrangements and partnerships can be worked out.

Some professors might be pleased at this bypassing and feel they'll finally be left alone. After all, in many countries, government interference in academic administration is a very real problem. However, an even bigger threat, I would contend, would be government deciding to circumvent universities when allocating certain funds for research! There is early indication of this in Canada, where the largest provincial government, for example, is setting up technology centres to advance industrial research and innovation. These centres are organized so as *not* to involve universities in their creation or management, and that was clearly a conscious decision. Some university people I've spoken to feel that the reason may have been to avoid having the centres lose their intended industrial focus or become diverted to serving faculty or institutional hobby horses. The University must show society that it can still offer the best overall return on investment. If industry co-opts this cutting edge location which, until recently, university has claimed, the unhappy result could be the separation of research and graduate training; and that situation would seriously weaken *basic* research.

Government must recognize that academic freedom is important to our general freedom and is the hallmark of an advancing progressive society. For their part, universities must look carefully at their present research agendas and curriculum offerings. Much of today's university research is derived from reading other researchers' problems, as described in professional journals, and taking them one step further. This is certainly valid and important especially in mathematics and the basic physical sciences. But there are other at least equally valid ways to identify problems and we should not downgrade problems identified by industry or government, especially in the applied and social sciences. I will refer to some of these problems areas shortly.

I would accept that the greatest ultimate payoff comes from giving solid support and carte blanche to people with *great* minds. Such great minds, let's be honest, are at best a distinct minority at most universities. Carte blanche for everyone does not necessarily represent efficient or realistic policy.

Let's examine the university's role in meeting the manpower needs of society. Universities are traditionally wary of responding to apparent oversupply or undersupply of various types of trained persons. After all, it takes a long time to gear up or down, and frequently one overshoots the mark with unfortunate results. They regard manpower need projections with rightful suspicion. But, there is also the tendency of professors in existing specialties to wish to reproduce their own kind and to teach what they are used to. When they are finally convinced by the demands of *students themselves* and by enrollment applications, they *do* change curriculum, but here again, they are usually reacting, seldom leading.

This kind of response, while understandable, seems to me to contain elements of living in the past. Manpower planning as a discipline *needs more research and study*. It is here to stay and the public rightfully demands that it not be ignored. Universities should be *leading the research efforts* in this field and increasing our understanding of the process. Universities tell governments, "Leave us alone, you don't know what future job needs will be...People need a *broad education* so they can adapt in later years." Well it is time universities assumed the lead by doing the research needed to tell society *just what constitutes a broadly educated person today*.

We sometimes hear about how universities suffer as a result of their post-World War II role of *educating the masses*. The argument goes that, when universities accepted the responsibility for educating everybody's children for employment, they gave up the basic reason for their existence as a temple of scholarship. The conclusion is that *therefore* universities have become mediocre. Well, there may be individual cases where the latter is true, but, if so, it is certainly *not* because of the larger responsibilities of educating society. Why should there be a dichotomy between educating the masses and discovering the truth? The university of today can do both jobs very well, as has been shown at so many outstanding institutions which have themselves had dramatic increases in student numbers since the Second World War. Of course, it's not a new problem. Around 1700, William Congreve similarly complained of falling standards when he said:

> Tis well enough for a servant to be bred at a university,
> but the education is a little too pedantic for a gentleman.

The real problem universities must face squarely has to do with *how* to educate society, not *whether* to educate society. Richard Gwyn, a well-known Canadian newspaper columnist put it this way: "At universities, the fastestgrowing faculties, and indeed just about the only ones to grow at all these days, are those of business administration and management science. Yet because of the inflexibility of university finances, and more particularly because of the bills for the social sciences splurge of the '60's, management classes are twice the size of the university average, while their faculty budgets are one-quarter to one-third the size. The nature of the mismatch is clear: we're spending vast sums to educate people for jobs that no longer exist and, as a result, have little money to train people in the skills that they, and the economy need." Let me hasten to add that I feel there is still a very great need for the social sciences, although I would like to see them focus more on some of the great issues of our day, which I shall touch on shortly.

The task for universities is clearly to take a role - once again I use the word "leadership" - not only in planning for the future, but in planning the future. Research into education itself must be seen to be a fit subject for study. In Canada, and I'm sure in many of the other countries represented here, a large number of the academics involved in post-secondary education research do it part-time, and for the majority of them, this research is an area of secondary interest. Research on higher education is usually sporadic and unintegrated. It is ironic that we expect successful knowledge-based industries to do R & D, yet the universities do very little research into their own major function in the education industry.

Finally, on the subject of leadership, shouldn't universities be in the vanguard of thought and study concerning the major issues of our time? I think especially of the social sciences where such a focus could be of enormous benefit to all of us. Let me mention two of these major issues as I bring this paper to a close.

There seems little doubt that we are watching the start of a profound change in our work and our society, based on new technologies, especially those related to the microprocessor. It is fair to refer to these changes as a major industrial revolution. Yet, while certain individuals in the universities are doing basic and important work, the universities are not leading the rest of us to understand what the world of the future will be like. This is left to popular authors or news magazines. I'd like to see social scientists at our universities studying the implications of these changes and disseminating information about them. I'd like to see our professors debating this subject and our students learning about it.

For better or worse, universities represent their countries' principal source of talented people and new knowledge. With this resource goes a duty to address society's most pressing needs. As independent institutions there is a special responsibility to attend to issues that are truly fundamental.

That leads me to a second great issue of today, the arms race, draining our economies, distorting our world and threatening the survival of our civilization.

But few universities are working on the problem of arms limitation. Many are working, directly or indirectly, on new weapons, but how many are doing research in strategies or technologies for disarmament?

I would like to heap praise on our host country for a moment and their Stockholm International Peace Research Institute. It is an independent institute for research into problems of peace and conflict, especially those of disarmament and arms regulation. It was established in 1966 to commemorate Sweden's 150 years of unbroken peace.

I think our universities might take a leaf from that book and, in a spirit of determination, help in taking those urgent steps toward a world less shaped and dominated by the instruments of war. H.G. Wells said: "Human history becomes more and more a race between education and catastrophe." Universities should decide *which side they're on*. Our scientists, and others, should be leading our efforts with research and scholarship on this issue.

If universities are to turn today's problems into tomorrow's opportunities, they will have to create an atmosphere favorable to certain changes of style and emphasis. They must lead our attack on *targeted*, *broad* questions such as the arms race, the industrial structure, the university-industry interface, manpower planning and educational policy. To do so, universities will have to encourage broad, *interdisciplinary thinking and teamwork* rather than exclusively specializedeeffort. In depth work is essential, of course, but today's problems are more likely to yield to individuals and groups that *cross* disciplinary boundaries rather than those who stick within narrow existing disciplinary confines. Perhaps I'm wrong but I get the impression that Ph.D. theses are getting to be narrower and narrower rather than demonstrating breadth of thought and synthesis of ideas.

Universities will have to reagrd not only individual phenomena but also *institutional* matters as fit subjects for first class research.

This group understands this, being devoted to institutional research. But, for those of today's important problems which must be solved, lest failure to do so leave us with irreversible results, the institutional approach is the only viable one. The behaviour of governments, industries, planning agencies or societies need to be studied differently yet we generally place a much higher priority on the analysis of individual phenomena.

I feel confident universities will respond to the challenge. They must protect academic freedom successfully, but they must also serve the public interest, by *leading* society's thinking and planning, as no other institution can.

CHANGES IN FACULTY CHARACTERISTICS, ACTIVITIES AND ATTITUDES OVER 25 YEARS AT A MAJOR UNITED STATES UNIVERSITY[a]

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Universities are changing, markedly so in the recent decade. In 1956 the University of Minnesota had a full-time student enrollment of about 25,000 and a full-time faculty of about 1500. In 1980 these respective figures were 56,000 and 3000. Other things have changed, too, such as expectations of and attitudes toward higher education on the part of the public, the roles of the federal and state governments, and the expansion of opportunities for higher education. Within the institutions changes have occurred in managerial style and operation, administrative-faculty relationships, institutional relationships to the communities within which they are located, expectations of faculty by administrators, and a basic change from an expanding enterprise to a static or stable enterprise. It seems worthwhile to consider to what extent such changes should be accompanied by changes in the nature of the faculties that staff the institutions. But before such consideration is possible, it is important to determine to what extent, if any, changes have taken place over time in faculty characteristics, attitudes, and activities. With such information one can consider such questions as: Are the changes desirable in view of the changing attitudes about higher education and colleges and universities? Are strains of incompatibility threatening faculty effectiveness? What factors contribute to changes in attitude and satisfaction with college teaching as a career? A three-decade series of studies at the University of Minnesota makes possible a comparison of faculty characteristics, activities, and attitudes over a 25-year span, based on information gleaned from questions common to the three questionnaire surveys made.

A 1956 study by Stecklein and Eckert (4) was designed to determine general information about college teachers in the state of Minnesota. What were they like? How did they become college teachers? How did they spend their time? How did they feel about their jobs? In the 1960's opportunities for faculty research and consultative activities rapidly expanded as college and university enrollments also increased. To determine how such changes affected faculty, in 1968 Eckert and Williams (1) repeated the 1956 study. Ladd and Lipset (2) conducted an extensive national study in 1975 and the National Education Association (3) completed a survey of faculty characteristics and opinions in 1978. In the late 1970's and 1980's, however, new problems of academic retrenchment, unemployment, shifts in student demands for programs, and an impending era of steady state for higher educational institutions combined to suggest the desirability of a study which would provide data that could be compared with the 1956 data and similar information from the 1968 study.

This report focuses on comparative data about the largest of the 44 institutions included in the 1980 study--the University of Minnesota. Information about faculty members in the other private and public institutions has been reported in other articles (5), (6), (7). Comparisons will be made primarily between the 1956 and 1980 data, but findings from the 1968 study will be introduced whenever they seem especially pertinent.

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[a] Data have been excerpted from the Minnesota College Teacher Study, by Stecklein, J.E., Willie, R., and Lorenz, G., Univ. of Minnesota, (in press).

DATA SOURCES AND METHODOLOGY

Data were collected using lists of regular full-time faculty produced by central administration. Individuals who were full-time administrators, counselors, librarians, and researchers were then excluded. Full-time teaching faculty were therefore defined as persons teaching at least one course during the year. The population was stratified by rank within each college and a 25 per cent sample of 759 was obtained. Of these, 215 were found not to fit the definition, had left the institution, or were on leave. This latter number was further reduced to 331 for this report because the medical/dental faculties were excluded, to keep the data comparable with the earlier studies which did not include such faculties. Data were collected by means of a 6-page questionnaire, using check-lists and free-response items. Three follow-up mailings were used.

The Questionnaire

The questionnaire collected information in five areas: people, events and conditions which influenced the choice of teaching as a career; education and previous experience; professional activities in current positions; satisfactions and dissatisfactions with college teaching; and demographic information. This article focuses primarily on information from these sections in the questionnaire; education and previous experience, professional activities, and satisfactions and dissatisfactions with career.

Standard Error

The sample sizes in the three studies were as follows: 1956--250; 1968--455; 1980--331. Analyses showed that they were representative in terms of sex, rank, and subject fields, so comparisons between the sets of data seem to be appropriate. Nevertheless, data are provided here concerning the standard errors of measurement for the 1956 and 1980 data, to assist readers in interpreting comparisons of percentages from the two sets of data. The standard errors of the percentages are 3.2% for the 1956 data and 2.7% for the 1980 data, for percentages around 50%. Thus one is 95% certain that the population percentage for a given 1956 figure lies within ±6.3% of that figure and within ±5.3% for a 1980 figure. For figures less than 20% or greater than 80%, the 95 per cent confidence intervals would be slightly less than ±5% for each of the two groups. Therefore a difference in percentage between the two groups should probably be considered a real difference, rather than a sampling variation, only if the difference is 12% or more at the middle range and 7% or more at the extreme ends of the percentage scale.

FINDINGS

Age, Sex, and Other Background Data

In 1956 the median age of University of Minnesota faculty members was 43.2 years (see Table 1). In 1980 it was 44.4 years, but up from 41 years in 1968--a more noticeable increase. Whereas about a fourth of the faculty in 1956 and a third of those in 1968 were under 35 years of age, only 18% were in that age range in 1980. The effects of recent retrenchment are clearly evident, with sharp decreases in the number of younger faculty and increases in the faculty over 50 years of age.

TABLE 1

AGE DISTRIBUTION OF UNIVERSITY OF MINNESOTA FACULTY
1956, 1968, and 1980

	1956	1968	1980
Under 35 years	23%	33%	18%
35 - 49	47%	42%	48%
50 or older	30%	25%	33%
Median Age	43.2	41	44.4

Source: Data from Minnesota College Teacher Study

The proportion of women faculty members has increased somewhat, from 17% in 1956 to 21% in 1980. Some effect of affirmative action to increase the proportion of women faculty members may be apparent here because the increase between 1956 and 1980 was only one perccent compared to an increase of 3% since 1968.

The change in age distribution and changes in life styles have off-setting effects on data on marital status. Although a higher proportion of 1980 than of 1956 faculty members were married (78% compared to 65%, respectively, a larger proportion were also separated or divorced (7% and 3%, respectively).

The proportion of Minnesota natives on the University faculty has decreased from 25% to 19% since 1956 but the proportion of faculty members born in foreign countries has remained stable at about 10%.

Faculty members in the 1980's appear to continue to be drawn from the same socio-economic levels as in 1956, at least as reflected in the occupations of their fathers listed in Table 2. In both 1956 and 1980, the occupational field of the father reported most often (by 29% in 1956 and by 26% in 1980) was skilled trades and farming. About one faculty member in six listed a profession (other than teaching or ministry) as their father's occupation, both in 1956 and in 1980. The only significant change in mother's occupation was a decrease in listing of "housewife" from 66% in 1956 to 53% in 1980. Obviously more mothers had taken other jobs--spread uniformly among the occupational categories--but more than half remained identified as housewives. Eckert and Williams (1, p. 40) deplored the homogeneity of university faculty members and suggested that stronger efforts should be made to recruit faculty members from different social and academic backgrounds. No overt efforts in this direction have been made at the University of Minnesota and changes do not appear to have occurred naturally.

Choice of College Teaching as a Career

Consistent with findings from earlier studies, Minnesota university faculty members typically waited until relatively late in their educational preparation to decide to become college teachers. In the current study, more than a third (34%) did not decide to become college teachers until they were in graduate school. An additional 8% waited until after they received their highest degree before deciding. Twenty-nine per cent decided while they were working toward their baccalaureate degrees. The comparable figures for the 1956 faculty were 23%, 8%, and 25%, respectively. Thus more of the 1980 than of the 1956 faculty waited until they were in graduate school before choosing college teaching as a career. College teaching was the career goal of 5% of the 1980 University of Minnesota faculty when they were college freshmen, of 24% when they received their bachelor's degrees and of 63% when they received their highest degrees. The first two percentages are twice those reported in the 1956 study and the last percentage is 25% higher than in 1956.

TABLE 2

FATHER'S OCCUPATION, UNIVERSITY OF MINNESOTA FACULTY
1956 and 1980

Occupational Field	Percentage of Faculty	
	1956	1980
Unskilled and semi-skilled labor	9.2	7.9
Skilled trade and farmers	29.2	26.3
Clerical and sales	11.2	9.1
Managerial (own business)	20.0	17.8
Professions (excluding teaching and ministry)	14.4	17.5
Elementary/Secondary teaching	3.6	4.8
College teaching	4.0	5.7
Other or retired	3.6	4.8
No response	2.0	6.1
TOTAL	100.0%	100.0%

Source: Data from Minnesota College Teacher Study

When asked to indicate what factors influenced them to choose to become college teachers, 1980 faculty members stressed personal factors even more than did the 1956 faculty members. Provided with a list of potential situational and personal factors that have been found to be influential in career decisions, 1980 faculty checked personal or internal factors four times as often as they did situational or external factors (see Table 3). Findings were generally consistent with those of 1956 except that the 1980 faculty marked more choices than did the 1956 faculty. The most influential factor, as indicated by frequency of mention, was the intellectual challenge provided (68%), but very close in second place was an appreciation of the kinds of working conditions provided by a college teaching position (66%). The 1956 faculty also stressed these two factors, but the category working conditions was checked most often (46%) followed by the desire to pursue research in their fields (45%) and a desire to continue to study subjects of deep interest (44%). These latter two factors were also mentioned frequently by the 1980 faculty, but in 4th and 3rd place, respectively.

TABLE 3

FACTORS THAT INFLUENCED UNIVERSITY OF MINNESOTA FACULTY MEMBERS TO ENTER COLLEGE TEACHING, MINNESOTA COLLEGE TEACHER STUDY

Influential Factors	Faculty 1956	Faculty 1980
Situational		
High school staff member suggested it	2.4	5.1
College teacher recommended it	28.0	34.4
Administrator/counselor suggested it	20.0	16.0
Relative encouraged it	9.6	16.0
Graduate assistantship/fellowship was available	35.2	44.0
College teaching job offered	34.8	22.7
G.I. Benefits facilitated study	16.4	13.6
Armed forces training led me into it	2.0	2.4
Spouse planned to be (or was) a college teacher	0.8	2.1
Just "drifted" into college teaching	8.4	16.6
Other	13.2	13.9
TOTAL[a]	170.8%	186.8%
Personal		
Interest in subject	44.0	59.2
Wanted to work with college-age students	33.6	44.1
Wanted job security and prestige	15.6	25.4
Contribution to field	32.8	39.3
Wanted to do research in my field	44.8	55.9
Could make best contribution to society	31.2	31.4
Liked the working conditions	46.4	66.2
Liked the academic life style	21.2	37.2
Wanted to emulate college professor	8.4	20.5
Liked the intellectual challenge	40.8	67.7
Other	9.6	7.3
TOTAL[a]	328.4%	454.2%

[a] The amount that a total exceeds 100 per cent indicates the extent to which more than one response was checked.

Of the situational factors listed, the offer of a graduate assistantship or fellowship was mentioned most often by both the 1956 and 1980 faculty members (35% and 44%, respectively). The change in the college teacher market is apparent in the decrease in mention of a college teaching job being offered although none was sought (1956--35%; 1980--23%).

When asked explicitly to check the single most influential factor, findings were consistent with the data reported above. Four times as many personal factors as situational factors were mentioned. However, the order of the factors changed: special interest in the subject was listed by 13% of the respondents, intellectual challenge by 10%, and desire to pursue research in the field by 9%. The situational factor mentioned most frequently as being most influential, by both the 1956 and 1980 faculties, was that an unsolicited college teaching job had been offered to them (12% and 6%, respectively). Each of the other situational factors received less than 2% response.

Educational Preparation

Perhaps the most significant change between the 1956 and 1980 faculties was in the highest degree held. Whereas in 1956 only slightly more than half (55%) had an earned doctorate degree (59% in 1968), more than three-fourths (78%) of the 1980 faculty members did so. More than half (56%) of the 1980 faculty and two-thirds of the 1956 faculty had received them within the preceding 15 years.

Inbreeding--defined as working in the same institution that awards one's highest degree--is of concern to many faculty and administrators. The proportion of faculty members who received Ph.D. degrees from the University of Minnesota remained constant (21%) between 1956 and 1980. However, the proportion that received doctorates from other Midwestern states more than doubled (from 16% to 34%). Such an increase in putative Midwestern provincialism might be a cause of concern to those who are troubled by inbreeding.

Data provided concerning sources of financial support during undergraduate and graduate schooling offer interesting insight into changes of pattern of such support over the 25 years studies. About two-thirds of each of the 1956 and 1980 faculties reported support from their parents during their undergraduate education. About 45% of each group earned money from off-campus jobs and 35% from on-campus jobs. More than a third relied on personal savings. Only in terms of scholarships and fellowships did the 1980 faculty differ from the 1956 faculty (43% won by the 1980 faculty and 21% won by the 1956 faculty. When asked to indicate the primary sources of undergraduate support, parents were specified by 40% of the 1956 faculty and by 30% of the 1980 faculty. A distant second, for both groups, was an off-campus job (20% and 12%, respectively). Thus the 1980 faculty relied to about the same extent as did the 1956 faculty on all sources of support except scholarships and fellowships at the undergraduate level.

At the graduate level, as might be expected, less reliance on parents was reported by both groups (16% and 15% for 1956 and 1980, respectively. Although 45% of the 1956 faculty had had teaching or research assistantships, 63% of the 1980 faculty had done so. Two out of five (43%) of the 1956 faculty held staff positions but less than a third (30%) of the 1980 faculty did so. This difference reflects one kind of managerial change. Three other changes appear to reflect attitudinal and/or economic changes. The percentage of faculty who relied on borrowed funds almost doubled from 1956 to 1980 (from 10% to 19%) and the proportion who relied on a spouse's earnings rose sharply from 13% to 30%. Reliance on scholarship aid more than doubled between 1956 and 1980 (26%) compared to 56%). For the 1956 group staff positions (30%) and assistantships (19%) were most often named as the major source of support, but the 1980 faculty most often mentioned assistantships (27%) and scholarships and fellowships (25%).

Professional Activities

With all the recent comment about pressures to publish, one might expect that University faculty members in 1980 would be spending more time on research and writing and less time on other things such as teaching, committee activities, or counseling. The figures tend to support the "publish or perish" contention. Whereas the 1956 faculty spent, in terms of a median, 55% of their time on teaching functions (class preparation, class activity, grading papers, making tests, and the like), the median figure for the 1980 faculty was 45%. On the other hand, the 1956 faculty spent a median of 13% of their time on research and scholarly writing while the 1980 faculty spent 20%. Surprisingly, percentage time devoted to committee and other administrative tasks was about the same--10% in 1956 and 11% in 1980. As one would expect, time devoted to all other functions--counseling services to student groups, and off-campus services declined accordingly, to the point where the median figures for such functions were less than one per cent each.

In terms of credit hours or class contact hours, too, the 1980 faculty spent less time than the 1956 faculty on instruction. In 1956, the median number of credit hours taught per faculty member was 8.0 and in 1980 it was 7.4 Comparable class hour medians were 10 and 9.5, respectively. It appears that the teaching load, in terms of credit or class hours, has not changed much but the amount of time devoted to the classes has declined.

Data in Table 4 provide a more complete picture of how University of Minnesota faculty distributed their time among teaching and research. Data on other functions have not been provided because of limited space. In 1956, 3% of the faculty spent less than 10% of their time on teaching; in 1980, 9% did the same. In 1956, 44% spent less than 10% on research or scholarly writing; in 1980 the comparable figure was 27%. In 1980 more faculty spent more time, proportionately, on research than in 1956. In 1980, 42% spent between 20 and 60 per cent of their time on research compared to 30% who did so in 1956. Whereas 52% of the 1956 faculty spent between 40 and 79 per cent of their on instruction, 57% did so in 1980. As would be expected, more of the 1956 faculty than of the 1980 faculty spent higher proportions of time on instruction but fewer spent higher proportions of time on research.

Faculty members in 1956 as well as in 1980 professed a desire to reduce the amounts of time spent on administrative activities and to increase the time spent on research. About two-thirds of both groups wanted to spend more time on research while only 17-19% wanted to spend more time on teaching.

Other Professional Activities

Information was not collected in the 1956 study regarding publications, grants sought and received, or consultative activities of the faculty, but such data were collected in the 1968 repeat of the earlier study. Some comparisons of 1980 and 1968 data are therefore possible. Even though they cover only a 12 year span, the differences are helpful in pointing toward changes in faculty activities over time.

Publications. Information was collected concerning the number of different types of publications that faculty members had produced in the 5-year period prior to the study. Types of publications included books or monographs, chapters in books, journal articles, book reviews, study guides or other teaching materials, and unpublished papers presented at professional meetings. An additional category was listed to enable those who had produced creative works of various types to describe them and to indicate how many they had produced.

TABLE 4

PERCENTAGE OF TIME DEVOTED BY UNIVERSITY OF MINNESOTA FACULTY
TO INSTRUCTION AND RESEARCH, FALL TERM, 1956 AND 1980

Per Cent Time Spent	Instruction		Research	
	1956 Faculty (N=250)	1980 Faculty (N=331)	1956 Faculty (N=250)	1980 Faculty (N=331)
0-9	3.2%	8.8%	44.4%	26.9%
10-19	4.4	2.4	22.4	22.7
20-39	23.2	23.6	18.8	26.6
40-59	26.0	35.3	10.8	15.7
60-79	25.6	22.1	3.2	5.1
80-89	9.6	5.4	0.0	1.5
90-100	8.0	2.4	0.4	1.5
	100.0%	100.0%	100.0%	100.0%
Median	55%	45%	13%	20%

Source: Data from Minnesota College Teacher Study

Productivity of University of Minnesota faculty was up in all categories of publications listed when 1980 reports were compared with 1968 reports. The biggest increase (23%) was in the percentage of faculty who reported one or more unpublished papers presented at professional meetings. Close behind was a 20% increase in the number of faculty members who published one or more chapters in books. More faculty (71% in 1980 and 65% in 1968) published journal articles than any other type of publication.

The median number of journal articles published by 1968 faculty members was 4.9 during the five-year period; the comparable median for the 1980 faculty was 3.9. Thus, although a higher proportion was publishing journal articles, the median number decreased somewhat. On the other hand, 18 per cent of the 1968 faculty published 8 or more journal articles compared to 25 per cent of the 1980 faculty who published that amount. For the 1980 group the modal numbers of publications were as follows: books or monographs, 1; book chapters, 1; journal articles, 4 to 7; book reviews, 1; unpublished papers, 4 to 7; and study guides, 1.

Research Grants Sought and Received. When asked whether or not they had received a research grant from outside the university during the previous five years, 50% of the 1968 faculty said "yes" compared to 62% of the 1980 faculty. Thus an increase took place despite the reduction in funding opportunities that developed during the late 1970's. Of those who had received such grants, 47% received them from federal sources, and 22% received them from private foundations. Those faculty who were successful in obtaining a grant received 2.1 grants each, on the average. Unfortunately, comparable analyses of the 1968 data were not available. The data serve to emphasize the reliance of the University of Minnesota faculty on federal agencies, however.

Consultative Activities. Consultative activities during the 1950's were not considered to be widespread enough to warrant a question on the original questionnaire, but their rapid expansion during the 1960's and later prompted collection of information about their extent in the 1968 and 1980 studies.

About 3 out of 5 (58%) of the 1980 respondents indicated that they had served as professional consultants one or more times during the previous calendar year. In 1968, 50% had done so. Consultative activities of the 1980 faculty centered uniformly upon business and industry (27%), other colleges or universities (23%), federal government units (23%), and local or state government units (23%). Eleven per cent served private foundations and five per cent served as consultants in foreign countries. These figures are 4 to 5 per cent higher than the comparable figures for 1968 for each type of consultation, except for services provided to other colleges and universities, which more than doubled in frequency between 1968 and 1980. Income from consultative activities accounted for 10-19% of the total family income for a further (26%) of the 1980 faculty members. Another 10% reported that consultative fees provided between 20 and 39 per cent of their total income, and about 3 per cent claimed that 50 per cent or more of their income was derived from consultative activities.

Satisfaction with College Teaching as a Career

Respondents were asked to indicate on a five point scale ranging from very dissatisfied to very satisfied what their present attitudes were toward college teaching as a career. Responses show that 91% of the 1956 faculty and 90% of the 1980 faculty were generally satisfied with their careers. In addition to the decrease of 11%, however, the percentage of 1980 faculty who marked very satisfied (27%) was 19% lower than the percentage for the 1956 faculty (46%). Four per cent of the 1980 faculty marked very dissatisfied compared to 0.4% who did so in 1956. In terms of levels of dissatisfaction or satisfaction, with high satisfaction represented by a 5.0, the median rating for the 1956 faculty was 4.4 compared with 4.1 for the 1980 faculty. Thus, although the level of satisfaction slipped somewhat, 4 out of 5 of the 1980 University of Minnesota faculty were generally satisfied with their careers. Least satisfied were faculty in the biological sciences, religion, and medical fields other than medicine. High producers of unpublished papers were significantly less happy than others, also but no significant differences between sexes or age groups were found.

To determine more explicitly what some of the causes of dissatisfaction or satisfaction were, respondents were asked to indicate the two or three chief sources of satisfaction they found in college teaching. In a second question they were asked to cite three main sources of dissatisfaction. To simplify presentation the three chief sources of satisfaction have been combined into a single table (top half of Table 5) and the three chief sources of dissatisfaction have been combined into a single table shown in the bottom half of Table 5. Thus, if a respondent cited students as either the first, second, or third chief source of satisfaction, the response is included in the category labeled students. Because the table shows the combination of three responses on the questionnaire, the total percentage of responses exceeds 100%.

TABLE 5

CHIEF SATISFACTIONS AND DISSATISFACTIONS DERIVED FROM COLLEGE TEACHING AS A CAREER (3 RESPONSES COMBINED)

SATISFACTIONS

Source of Satisfaction	1956 Faculty	1980 Faculty
Students	72.8%	66.2%
Faculty	26.8	21.8
Administration	0.0	0.3
Intellectual Environment	28.0	24.4
Working Conditions	50.4	42.9
Kind of Work	40.0	51.4
Personal Development	4.0	8.1
Recognition	8.2	4.8
Other	4.8	20.0
	235.0%	239.9%

DISSATISFACTIONS

Source of Dissatisfaction	1956 Faculty	1980 Faculty
Students	10.0%	6.3%
Faculty	6.8	3.0
Administration	21.2	23.9
Lack of Intrinsic Rewards	8.0	9.0
Poor Working Conditions	33.6	67.4
Lack of Support	10.4	8.4
Inadequate Salary	50.4	44.7
Lack of Extrinsic Rewards	3.2	9.6
Other	11.6	22.7
	155.2%	195.0%

Sources of Satisfaction. In both 1956 and 1980 the predominant source of satisfaction was students--opportunity to work with college-age students, joy of watching students mature and learn, helping students, and so forth (mentioned by 73% and 66% of the 1956 and 1980 faculty, respectively). The source mentioned next most frequently by the 1980 faculty (51%) was the kind of work that one was permitted to do as a college teacher, but the second feature mentioned by the 1956 faculty (50%) was working conditions, that is, flexibility of scheduling and free summer time for research and travel. Overall, the sources of satisfaction listed by the 1956 and 1980 faculties do not differ significantly either in order or frequency of mention, varying between the two groups by only 5% to 9% on the major categories and even less on the less frequently mentioned categories.

Dissatisfactions. Similarities were also found in the frequency and order of mention of various sources of dissatisfaction by the 1956 and 1980 faculty respondents. Although various aspects of the job best characterized as poor working conditions were listed by 67% of the 1980 faculty, only 50% of the 1956 faculty mentioned that source of dissatisfaction. Inadequate salary was cited by 45% of the 1980 faculty and by 50% of the 1956 faculty (the complaint mentioned most frequently by the latter group). The influence of the recession, in both 1956 and 1980, is clear here because in the good economy of 1968 dissatisfaction with salary was only mentioned by 12%, fourth in frequency of mention after poor intra-faculty relations, administrative red-tape, and inadequate facilities. The third source of dissatisfaction--mentioned by 21% and 24% of the 1956 and 1980 faculty groups, respectively--was some aspect of administration. Typical comments alluded to incompetent or insensitive administrators, excessive bureaucracy, and loss of faculty governance, among others. It is clear, though, that the dissatisfied attitudes of faculty members--whether in the 1950's or the 1980's--primarily stemmed from what they perceived to be deterioration in working conditions and inadequate salaries. Things have not changed much over a quarter of a century.

CONCLUSIONS AND IMPLICATIONS

The fact that identical questions were included in three similar questionnaire studies covering a span from 1956 to 1980 makes possible some observations about the stability and variability of characteristics of full-time teaching faculty members of the University of Minnesota as well as their activities and opinions about their careers as college teachers. The following conclusions and implications are suggested:

1. An aging faculty indicates problems ahead.

Although the average age of the faculty decreased between 1956 and 1968, a sharp reversal has taken place between 1968 and 1980. The 1980 faculty consists of more middle-aged and older faculty members, with a concomitantly smaller proportion below the age of 35. Aside from the financial implications of maintaining a faculty with a top-heavy salary structure, such a shift has serious implications in terms of a lack of replenishment of young, vigorous staff with new ideas, interests, and points of view. New blood is essential to the maintenance of faculty vigor and vitality and avoidance of stagnancy.

2. Faculty continues to be predominantly male.

This fact in itself is not surprising. However, a quarter of a century has passed and the proportion of women on the University of Minnesota faculty is not significantly different than it was in 1956. The 1980 proportion--21%--reflects a larger proportionate increase between 1968 and 1980 than between 1956 and 1968, but it nevertheless indicates that the recent efforts at affirmative action have not been successful in increasing the proportion of women on the faculty to any significant degree. In their 1958 report, Stecklein and Eckert called the failure to recruit capable women as college professors an unfortunate waste of a valuable resource. Now, 25 years later, little has changed in tapping that resource. In fact, with current economic conditions, the likelihood of improvement is even worse. The most talented women are likely to enter business or industry where the monetary rewards are much higher.

3. Faculty continue to come primarily from middle-class, Midwestern homes.

The largest proportion of University faculty members continues to be drawn from families in which the fathers were skilled tradesmen or farmers, as was true 25 years ago. Assuming that occupation reflects socio-economic level, University faculty have remained remarkably the same in terms of their origins. Considering the tumultuous times that institutions of higher education have been and are going through, with changes in function as well as changes in public attitude toward them, should not the faculty have origins that represent a variety of social and academic backgrounds?

Possibly related to the factor of homogenization is the question of academic inbreeding. Although the proportion of University faculty members who earned their doctorate degrees at the University of Minnesota has decreased somewhat over the 25 years span, the proportion who earned such degrees from other Midwestern public institutions has increased. The result is a heavy proportion of faculty with middle-class backgrounds supplemented by public Midwestern education. If a major university is to provide social criticism, research on society's problems, new ideas, and leadership, more concerted efforts should be made to recruit faculty from differing social, geographic, and cultural backgrounds.

4. Faculty reported more dependence on federal government for graduate training.

University of Minnesota faculty by and large were self-supporting during graduate training although mostly supported by parents at the undergraduate level. The 1980 faculty relied to a greater extent than those in either of the two previous studies on assistantships and fellowships during graduate education. Such reliance reflects added dependence upon the federal government. As tuition and costs increase, dependence on scholarships, loans, and jobs will increase. Federal and state agencies could use this dependence to improve the selection and training of college teachers and encourage earlier selection of college teaching as a career.

5. Stress on research and publication diverts attention from instruction.

In the 1968 study, Eckert and Williams noted a "flight from teaching", as reflected by faculty members spending less time on teaching duties than did faculty in 1956. Data from the 1980 study show a continued increase in time spent on research and a decrease in time spent on teaching as well as in the number of credit hours taught. This indicates that faculty may be paying less attention to their instructional responsibilities and to the students than they did in the past. It seems that, once again, we must consider whether it is necessary that each faculty member contribute in all three of the traditional areas of higher education--teaching, research, and service--or allow him/her to specialize in one or two of the areas.

6. Faculty characteristics are more like than unlike those of faculty 25 years ago.

Although the size of the institution has increased markedly, in both student enrollments and number of faculty, and the modes of operation and operating policies have changed a good deal, there has not been much change in the backgrounds and personal characteristics of the faculty members or in the types of satisfaction and dissatisfaction that they derive from their work as university teachers.

Although overall the 1956 and 1980 faculties expressed quite similar causes of dissatisfaction, it is interesting to ponder why they should be so alike when the scope and nature of the institution has changed so much. Both groups were dissatisfied because of what they perceived to be inadequate salaries. Economic recession was in existence during both studies and, as usual, educational salaries lagged behind those of other industries, so it is not surprising that poor salaries should be a cause of unhappiness--except for one thing. Faculty members in both groups were more internally than externally motivated to become college teachers and their sources of satisfaction were consistent with that internal motivation. That is, faculty members at both points in time said that they derived satisfaction from watching college-age students learn and grow, from the joy and accomplishment of working in a special field of interest and competence, from doing research and transmitting knowledge, from the intellectual stimulation of colleagues and students, and to a lesser extent, from various types of intrinsic rewards. If faculty exist and prosper primarily because of intrinsic rewards, why is there increasing concern about inadequate salaries? The parallel increasing concern about working conditions seems to suggest that the intrinsic rewards have been lessened, that conditions under which professors work are interfering with the realization of their goals to do good research and to transmit knowledge effectively. Because support has decreased--fewer teaching or research assistants, equipment obsolete, supplies restricted, and time for research or instructional preparation more limited--faculty members may be turning their attention to extrinsic rewards such as salaries. In other words, the point may have been reached where the current breed of college teachers, although initially prompted to enter the field because of their inner drives, are finding that the intrinsic rewards upon which they have long depended are no longer enough. Deteriorating conditions have reached the point where the intrinsic rewards can no longer be counted on and faculty are reaching for the more common reward for good performance--higher and higher salaries.

Furthermore, the operation of universities is increasingly emulating the productivity-for-pay reward system of business and industry, with emphasis upon constant and frequent accountability, improved efficiency, and cost-benefit analyses. The traditional unstructured, self-determined goals and fields of interest are being replaced by situations where research activities are dictated by what is most likely to be funded by this or that agency of the federal government, or by what is most likely to result in the greatest number of publications in the shortest amount of time. Underlying this change is an increased emphasis upon the extrinsic reward system--those who bring in the largest dollar amount of research or training grants, those who produce the most (not necessarily the best) publications and (not or) teach the greatest number of students receive the largest salary increases or most rapid promotions.

One might seriously question whether it is a good thing for a university faculty to remain the same in so many ways over a quarter of a century. As the institution changes, in response to change in society's attitude toward it and its functions, perhaps the nature of the faculty should change also. For example, maybe it should mirror society more in such things as age structure, sex distribution, socio-economic strata, achievement goals and life styles.

Should life in the ivory tower change? If not, steps should be taken to remedy the deterioration of working conditions that are impeding scholarly work and demoralizing faculty members. If yes, the type of characteristics, attitudes and motivations of university faculty should be identified that are compatible with the new operational modes, purposes and objectives of the "new" university. Graduate schools should change their selection procedures and training programs to produce people with such attributes and new faculty should be recruited by the universities. Administrators and faculty together must decide whether a university should provide a traditional, stable base of leadership for society or should attempt to conform more rapidly to society's ebbs and flows.

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FACULTY PROFILES IN A LONG-TERM AND COMPARATIVE PERSPECTIVE

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ABSTRACT

As a background for policy decisions about faculty staff changes a study is presented based on a simple staff index showing the basis for research in different areas. In contrast to monetary indices, a staff index gives comparable data over long periods and under certain conditions also internationally. When applied to the Nordic and some other countries, great differences emerged both with regard to "researcher density", faculty profiles and times for expansion during the period 1880-1980. Factors behind these differences are discussed and also some alternatives for the development of the universities in one of the Nordic countries up to 1999.

BACKGROUND AND PURPOSE

The planning processes in higher education do in practice often mean that decisions about changes in faculty staff numbers or structure have to be taken at a rather short time of notice. Even if the creation of new chairs normally have been preceded by faculty demands for several years, it happens not too seldom that an increase of faculty staff is the final outcome of politically strongly felt needs for more knowledge in certain applied areas of specific interest for the present moment. A still more problematic situation is represented by sudden demands from ministries of finance for budget cuts due to trends in the general economy. Both increases based on ad-hoc needs and decisions to fire staff or to close down departments have often far-reaching consequences for the possibility to realize a long-term policy. It is extremely difficult to build up again what once has been closed down. And even an ad-hoc based increase, welcomed as it often is in the beginning, may prove problematic in the long run, if it generates high consequence costs or in other ways "eats up" resources intended for more long-term needs.

In any case, all types of planning decisions affecting faculty staff numbers and structure, whether ad-hoc based or not, can be facilitated, if there is information at hand about the long-term development of research positions in different areas on a national or at least a regional level. For countries of small or moderate size it is often helpful to have an idea about the development of various research fields also in other comparable countries. Although the study to be presented here originally was carried out partly for other reasons, it happens to highlight the need for internationally comparable data about faculty staff development in a long-term perspective as a frame of reference for practical planning decisions.

EXISTING DATA SOURCES

Existing international statistics in higher education are suffering from several shortcomings particularly when there is a demand for longer time-series and comparability between nations. There is also an imbalance in favor of the student side in terms of new enrollments, total of registered students and/or examinations especially at the undergraduate level, while it is very difficult to get reliable and comparable information about faculty staff. In spite of ambitious efforts to collect information about faculty and staff from the member countries, one must admit that the Unesco Statistical Yearbook has been far from successful in this particular case. Too many countries do not give any information about staff and the comparability of reported figures is often low. Figures and name lists in the World of Learning contain too many errors to be useful for the present purpose, and neither publication does cover any longer period. As regards correct information about faculty and staff, the Commonwealth Universities Yearbook seems to be a source of high quality. So from this particular point of view it is a pity that so many nations do not belong to the Commonwealth. The companion volume International Handbook of Universities (8th ed. 1981) is unfortunately not complete enough to be useful. The Internationales Universitäts-Handbuch (1976) has for several universities a list of positions which are quite misleading with respect to the difference between different types of positions and honorary titles.

National sources contain two kinds of information. Firstly, statistics in monetary terms are often available, showing the part of the national budget spent on higher education for salaries, running costs, etc. Apart from the problems connected with private institutions, this type of data source does seldom give comparable information over longer periods not even within the same country due to administrative changes of budget titles, types of costs covered, not to mention the difficulties connected with the variations in purchasing power over time and between nations. From these points of view, the other type of data source has several advantages, viz. national registers or calendars of civil servants of the type which on an international level is represented by the World of Learning or the Commonwealth Universities Yearbook. After all, the mean capacity of a civil servant - even if he or she happens to be a professor - holding a certain type of position in the system of higher education is about the same over long periods irrespective of budget system, salary level, national currency and purchasing power. In addition, information about positions is relatively readily available in comparable terms long time back. Even if there are remaining problems as to the comparability of positions between different national systems including the difficulty to define the field of higher education in relation to secondary education in a comparable way between different countries, it did not from the very beginning seem too difficult to deal with such problems.

PROBLEM AREA AND METHOD

The problem area was defined as the national basis for research in different faculty areas in terms of the number of permanent research positions (PRPs), which primarily means professors and other tenured staff with main obligations to serve as researchers, provide research guidance and teach graduate students. By "starting from the top" we do not only avoid the difficulties connected with the borderline between secondary and higher education (including technical and further education) but we can also get a relatively clean measure of society's permanent basis for research and teaching in all kinds of recognized research fields. It is a conservative measure so far as it does not cover quite new areas in which permanent chairs have not yet been created, nor is research within the military system included. It has, however, some favor to define the problem area in terms of permanent positions, since it promises to give a relatively clear picture of the priorities in a society at a given time of what is regarded as recognized and established research areas in that particular cultural context.

In the first run, the study was limited to the four Nordic countries Denmark, Finland, Norway and Sweden. In a second run an extension is planned to include some other systems, which are relatively comparable as regards size of population, geographical conditions, economy as well as general social and cultural orientation, e.g. the Canadian provinces, the Australian states and New Zealand.

In the Nordic countries the positions as professor are roughly comparable as to demands for competence, application procedure, main duties and general status in the system. In Finland and Sweden are also included associate professors with tenure. In Sweden their title since 1979 is professor but they still have a lower salary level. In Norway also the corresponding "dosent"-category is included. Othersise a "docent" means an honorary title which does not qualify for inclusion among PRPs.

For each of the four countries the number of PRPs was calculated for every ten years during the period 1880-1980 with respect to different faculty areas. The source was the national calendar of civil servants for each state. For relevant parts of the analysis the population size was held constant, so the main indicator then became the number of PRPs per million inhabitants or "researcher density".

MAIN RESULTS

Up to 1950 the four Nordic countries show a very similar development in relation to their population size. By 1980 two of the countries have a much higher "researcher density" than the rest. Also the profiles vary. If all types of faculties are divided into two main groups the following pattern is found: The relative number of permanent research positions belonging to what can be called the cultural sciences (or "Geisteswissenschaften"), i.e. the faculties of theology, humanities, law and social sciences, went up to 35-40 per cent in three cases, while the fourth country deviated down to 23 per cent, leaving as much as 77 per cent for medicine and other natural and technical sciences. There are also marked and typical differences of a more detailed kind as far as faculty profiles are concerned.

Also the periods during which the different Nordic countries expand their systems vary in a characteristic way with political and economic conditions. Finally, for one of the Nordic countries, which has the lowest proportion for liberal arts and social sciences, two alternatives are discussed for the development of its faculty profile up to the year 1999.

In this summary we have so far deliberately avoided to tell who is among the four Nordic sisters. In terms of general economy one of them is generally regarded as somewhat less wealthy than the other ones. One of them, Sweden, has a considerably greater population (8.3 million) than the rest. When it comes to permanent research positions especially in the cultural sciences there is one Nordic country which deviates from the other three in a manner that resembles the characteristics of a Cinderella, while two countries seem to have as their policy to keep the researh basis, as measured here, on a high level of quality.

Now, who is Cinderella? Let us start by examining the details of the present situation, i.e. 1980.

Totals for 1980

In spite of the lower population, Finland has the greatest amount of professorships in 1980, followed by Sweden (Fig. 1, left). When a correction is made for population size, it is evident (Fig. 1, right) that Finland and Norway have much higher "researcher density" (292 and 240 PRPs per million inhabitants) as compared with Sweden and Denmark (163 and 148 respectively).

FIGURE 1

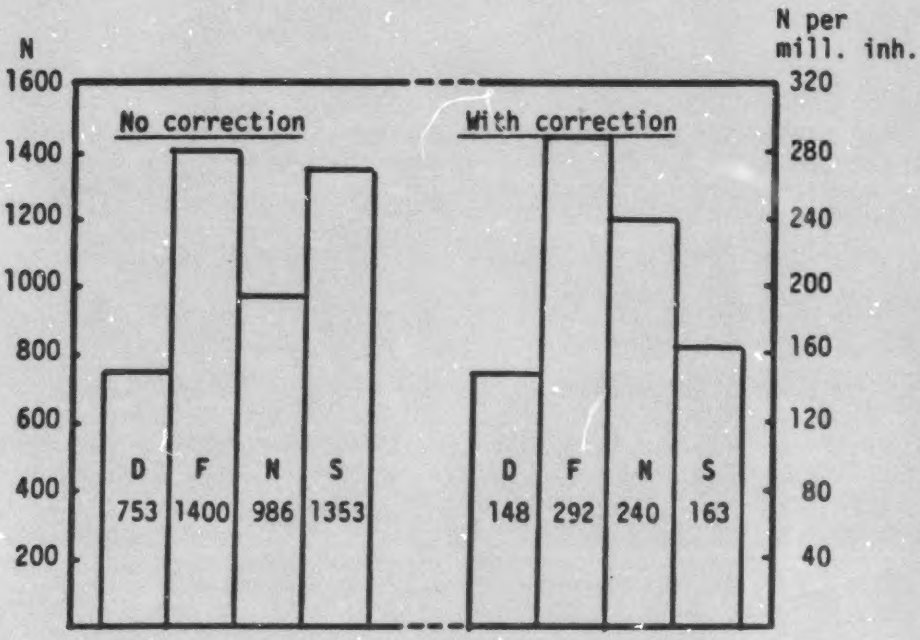

Fig 1. Number of permanent research positions (PRPs) 1980 in four Nordic countries. Totals (left) and with correction for differences in population size (right).

D = Denmark
F = Finland
N = Norway
S = Sweden

Two main groups: Cultural and natural sciences

In the next step, the totals have been broken down into two main groups. To the cultural sciences belong in this case the liberal arts and social sciences as well as the faculties of theology and law. All other faculties - including institutes of technology - are here summarized under the label of natural sciences.

As shown in Table 1, it is Sweden that deviates from all its nordic sisters through its high proportion (77 per cent) for natural sciences.

TABLE 1

DISTRIBUTION OF PERMANENT RESEARCH POSITIONS (PRPs)
WITH RESPECT TO CULTURAL AND NATURAL SCIENCES.
PER CENT OF ALL POSITIONS IN 1980.

Groups of faculties	Denmark	Finland	Norway	Sweden
Cultural sciences	39	39	36	23
Natural sciences	61	61	64	77
TOTAL	100	100	100	100

A further break-down on six faculty groups in 1980

In Fig. 2, we have made a further breakdown of the data on the following main six faculty groups:

(1) Humanities and theology
(2) Social sciences and law
(3) Medicine and dentistry
(4) Agriculture, including forestry and veterinary surgery
(5) Mathematics and other natural sciences
(6) Technology

In absolute numbers, Fig. 2, left), Sweden is in the lead in medicine, technology and agriculture, Finland in the remaining three groups. When corrected for population size (Fig. 2, right), Finland comes out as particularly strong in the social sciences and technology, while Finland and Norway are about equally strong - but far ahead of their sisters - in the humanities and sciences. In spite of all Nobel-prize glamour Sweden is remarkably low in the natural sciences, and holds the last position both in the humanities and the social sciences.

Development since 1900

The curves in Fig. 3 show the development from 1900 for the two main groups of cultural and natural sciences in relation to the population size every even tenth year.

For the cultural sciences the four Nordic countries follow each other in a relatively even way up to 1960, when the dispersion becomes very marked. The natural sciences show a similar picture, but on a higher level and with greater dispersion already from 1920.

Increases during different decades

In Fig. 4 we have plotted the increases for the four Nordic countries during each decade since 1900 in per cent of the number at the beginning of each ten-year period.

FIGURE 2

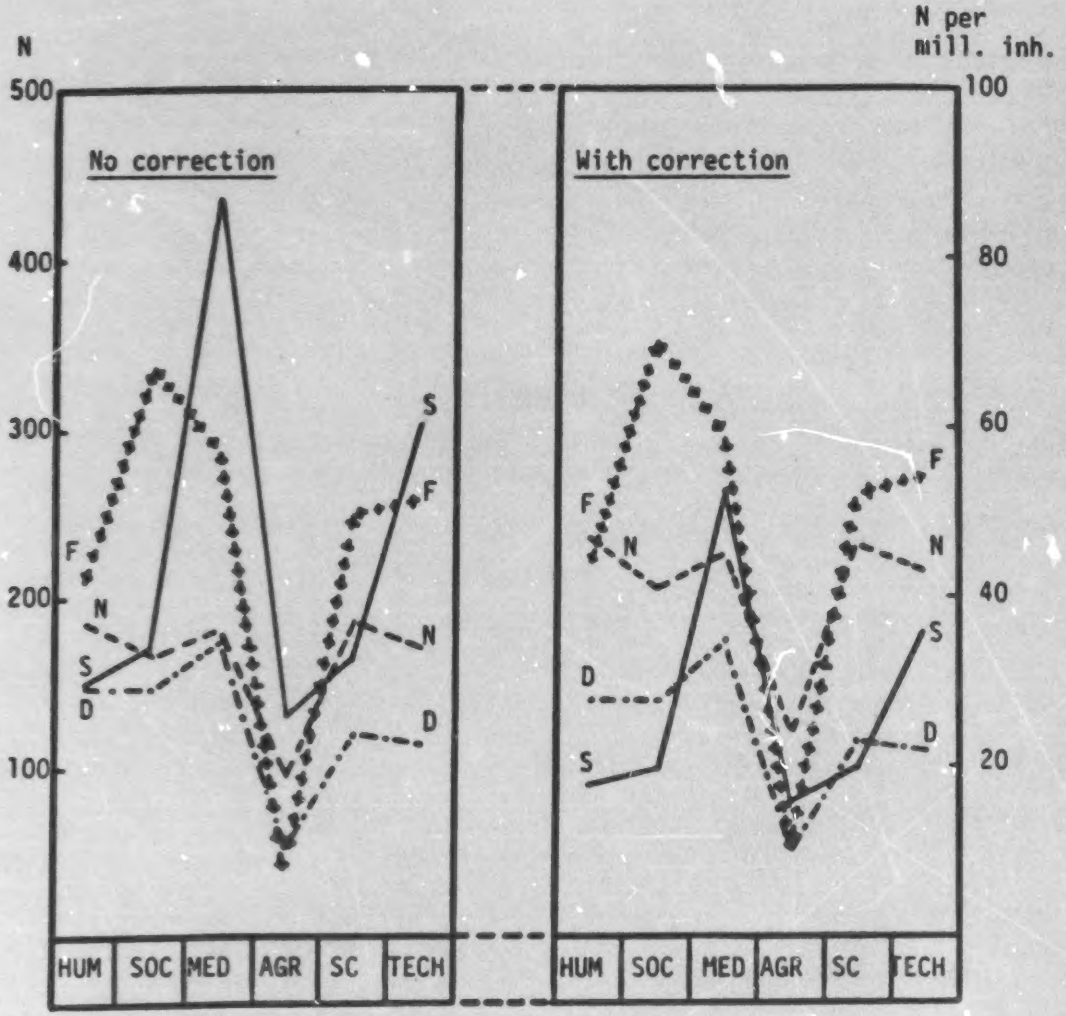

Fig. 2. Number of PRPs 1980 in four Nordic countries distributed over six faculty areas (see text). Totals (left) with correction for differences in population size (right).

FIGURE 3

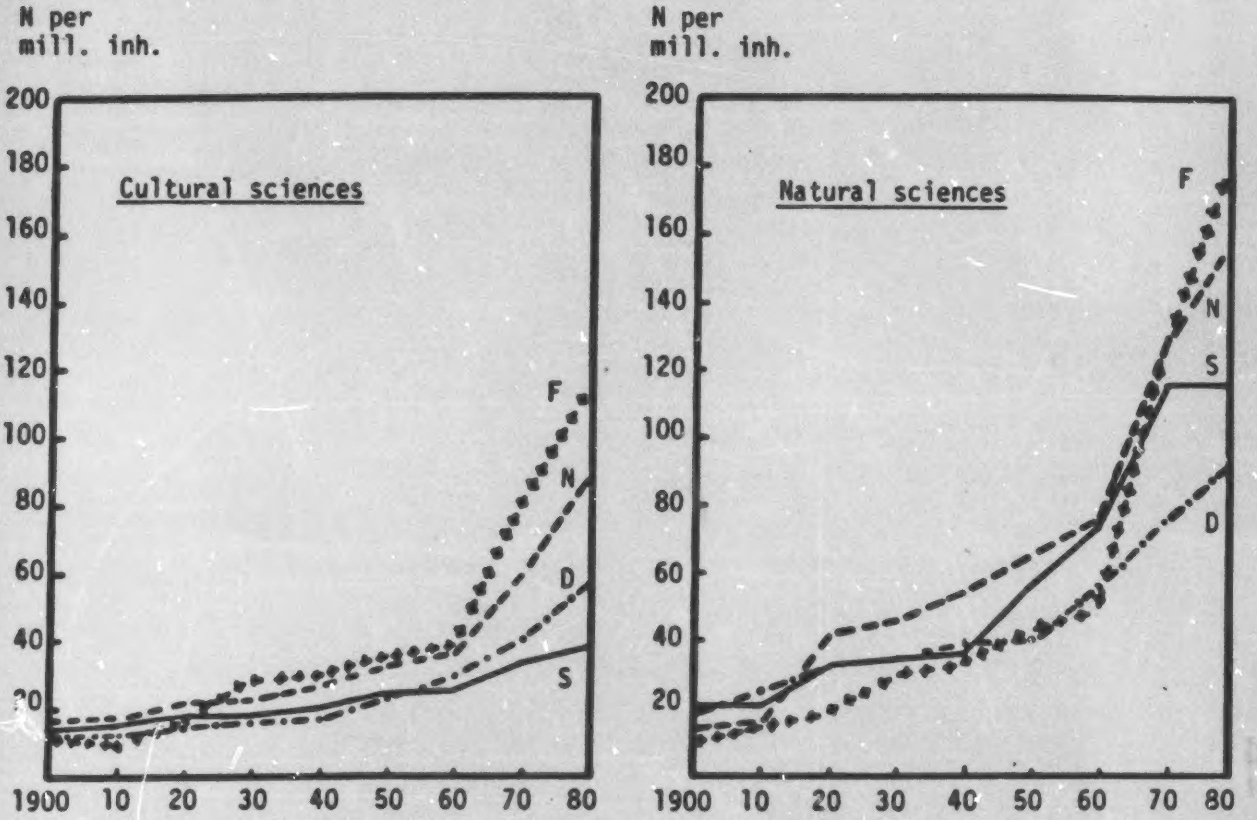

Fig. 3. Development of permanent research positions (PRPs) 1900-1980 in relation to the population size in four Nordic countries.

FIGURE 4

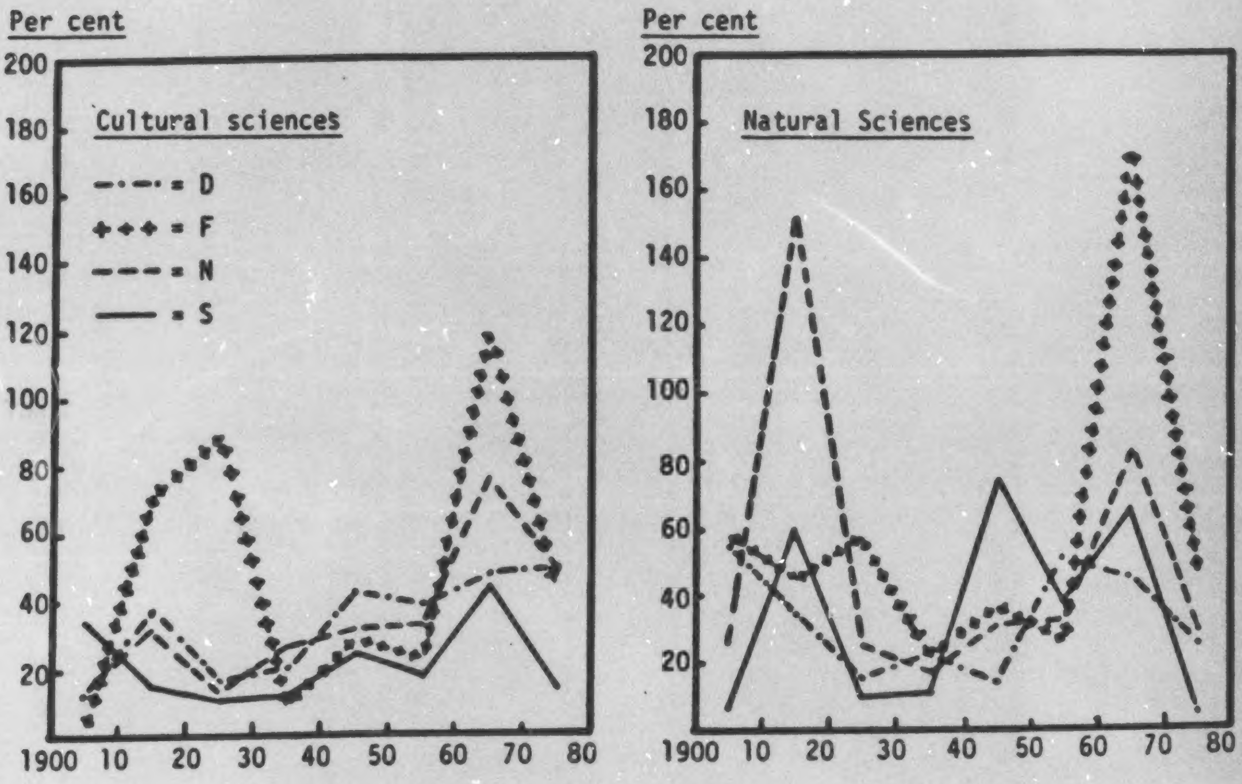

Fig. 4. Increase in the number of permanent research positions (PRPs) per ten-year period in relation to the numbers in the beginning of each decade.

It would lead too far away to make comments on all details here. However, some main points should be emphasized.

(1) There are marked differences between the nations. Finland and Norway have very high increases during certain periods.

(2) Some of the most prominent increases in the beginning of the century coincide with political deliberations, as when the union between Sweden and Norway was dissolved in 1905 and when Finland became independent in 1919.

(3) Finland is the only nation which has increases of any size in the 1920s, the decade immediately after its independence.

(4) After the second world war, Sweden, which was not drawn into the war, has an early increase in the natural sciences, while the expansion is very marked for Finland in the 1960s. In the 1970s Sweden has remarkably low increases.

Alternatives for Sweden up to 1999

The Swedish development has been subject to a more detailed analysis by Dahllöf (1980a). An example is shown in Fig. 5 which gives the relative development for the cultural and natural sciences since 1870. The latter have become particularly dominant in the research community after 1940. And yet, nothing is here shown about the great differences with regard to student/teacher ratios, which is particularly unfavorable for the humanities and the social sciences.

The prevailing pressing economic situation has given rise to many demands for new investments in science and technology also in terms of more research positions. This has been questioned by the present author (Dahllöf 1980b), since the already existing chair-holders primarily in medicine and technology have not too many doctoral students around them. Also the social problems connected with the technological development and - not least - the immigration situation (cf. Dahllöf 1981) call for a policy which allows the liberal arts and social sciences to increase more than before. Also the pure sciences seem to need to be strengthened, even though the arguments cannot be repeated here.

An illustration of the present planning dilemma is offerediin Fig. 6 which is borrowed from a debate article by Dahllöf (1980b). Here an assumption was made, that the great expansion rate after 1940 cannot be upheld for 1980-1999. During 1940-1959 the number of PRPs increased by 105 per cent. The corresponding figure for 1960-1979 was 80 per cent.

For the rest of the century two hypothetical examples are discussed. Both of them assume, that the total increase for the next 20 years period will be lower than before, but still amount to 50 per cent. In oneecase (Fig. 6, left) increases of that size are evenly distributed over all faculties. The final outcome is that Sweden by 1999 will be almost entirely dominated by professors of medicine and technology.

Another hypothetical alternative implies that the net increase for medicine and technology can be held at a lower rate, e.g. 20 per cent. Besides the fact that the present number of doctoral students is relatively low and, thus, can be increased without creating new chairs, there is also the possibility of creating

FIGURE 5

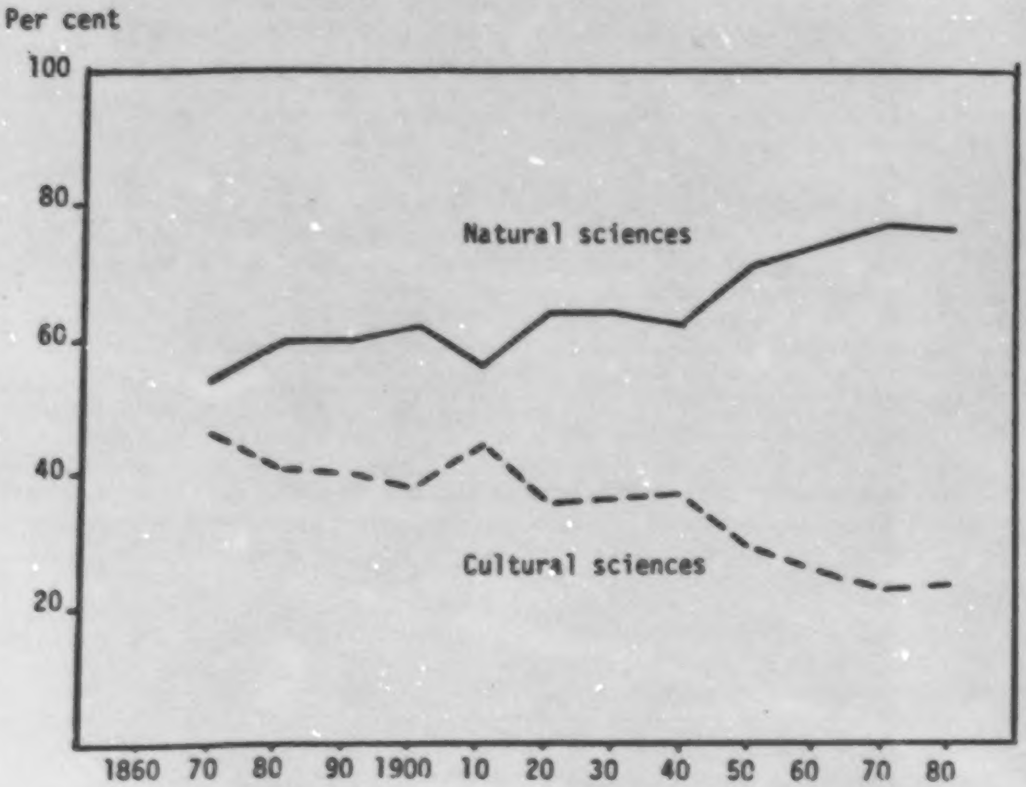

Fig. 5. The relation between permanent research positions (PRPs) in Sweden 1870-1979 in cultural and natural sciences. Per cent of totals for 1870, 1880 etc.

FIGURE 6

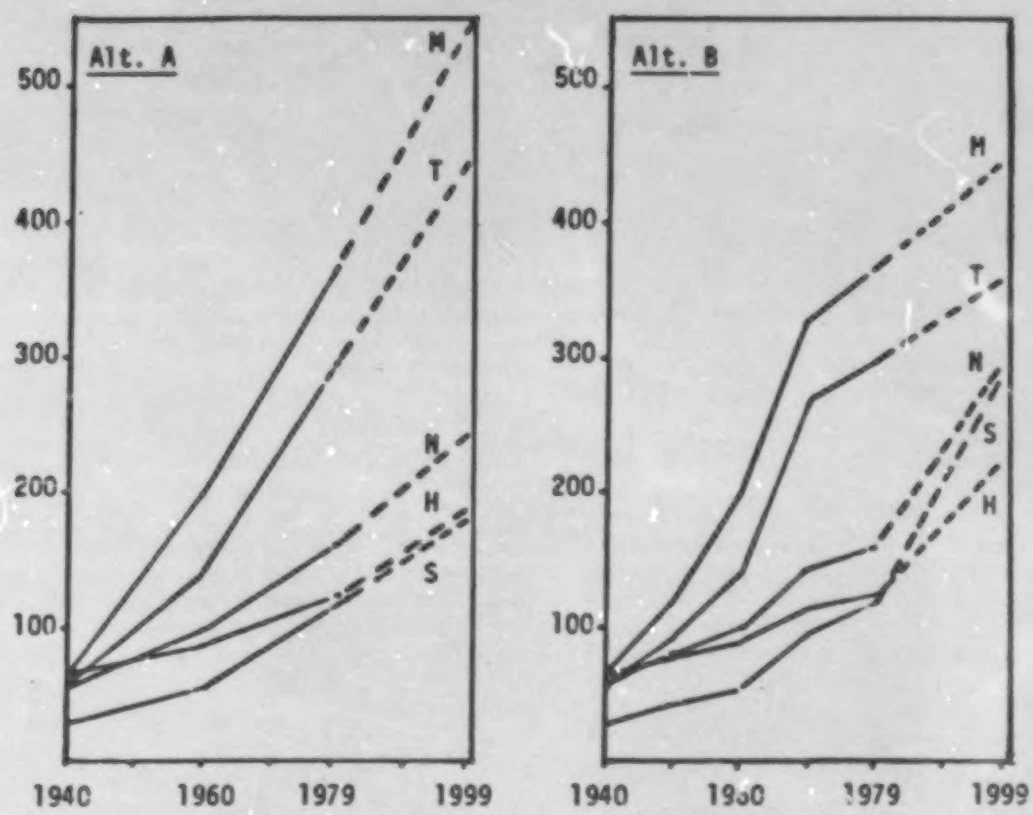

Fig. 6. Two hypothetical alternatives for the development of permanent research positions in five faculty areas up to 1999. Total increase in both cases 50 per cent during 1980-99. A: Even distribution of the 50 per cent increase. B: Restriction on the faculties of medicine and technology down to 20 per cent net increase, plotted against curves for ten-year intervals 1940-1979.

new specialities out of old positions when their holders retire. That type of procedure is already recommended by the authorities, but practiced to a low extent. The opportunities for this type of renewal are particularly good in the two areas mentioned above both because they have a high number of chairs and since there are great structural changes in the field. Consequently, the net number of new positions could be kept at a lower level than for other areas, which now operate under difficult conditions. In the right part of Fig. 6 is shown to what extent such a policy could give room for a substantial contribution to the lagging areas of humanities, social sciences and pure sciences, given the same total amount of new positions, which in both cases will end up in a total number of 1999 by the year 1999.

DISCUSSION

In a conference presentation like the present one, it is, of course, impossible to make any in-depth analysis of the trends presented above. Let us therefore only underline some main points, which have been elaborated somewhat more in the the original Swedish reports (Dahllöf 1980a, 1980b, 1982).

Even a quite simple staff index like the one presented above seems to be useful by providing a frame of reference for the long-term development of different faculty areas.

Behind the differences between the Nordic countries several factors should be discussed. Among these are both more general political and economic conditions but also specific policy measures and consequences of differences, e.g. in the regionalization policy. Another policy issue has to do with the strong expansion of the Swedish undergraduate level since the 1960s, the higher education reform (cf. Premfors & Ostergren 1978, Dahllöf 1977) and the basic rule that in the philosophical faculties - to which access was open until 1977 - professors should not teach at the undergraduate level. Instead a great number of positions as senior lecturers was created, without duties to participate in research or research guidance.

CONCLUSION

The pattern of findings gives several indications of the fruitfulness of relating the faculty and staff development to more profound political and economic conditions as well as to educational traditions and cultural value preferences. It opens a gate from administration and planning to more fundamental historical and social research. But the approach seems also to provide a quite practical yardstick for international comparisons and a useful frame of reference for the decision making in the planning process.

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THE EFFECT OF FACULTY REPUTATION IN AN INSTITUTIONAL REWARD STRUCTURE: A PRELIMINARY ANALYSIS

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This research is based on the proposition that the extent to which an institution guides or adapts to society depends, in part, on the reputation of the institution, in general, and the reputation of the institution's faculty, in particular. Furthermore, it is suggested that the reputation of the institution depends on the extremes of the faculty distribution in terms of the reward structure of that particular institution. This research explores the extent to which an institutional reward structure systematically identifies individuals who are crucial to its reputation and rewards them.

The purpose of this paper is to discuss several possible alternatives of conducting an evaluation of the institutional reward structure from an institutional research perspective (i.e., from the internal records of the university) while describing in detail the results of the first in a series of studies of the reward structure in a particular institution.

University Reward Structures

Although this particular study involves an American university's reward structure specifically with regard to increments in salary level, it is suggested that even in the most severe time-in-grade systems there exists a structure of institutional reward. Decisions concerning promotion, tenure, endowed fellowships, positions of governance, the allocation of travel funds, and the academic assignment represent possible institutional reward structures that could exist in systems where salary decisions are not discretionary. Bevan (1979) and Fincher (1980) suggest a number of innovative rewards (including such incentives as visiting lectureships, and the establishment of positions for distinguished teaching professors and distinguished research professors that could be incorporated into an institutional reward structure.

It is suggested that institutional researchers working in a university which employs any (or all) of these reward structures could investigate the extent to which this phenomenon operates in a systematic way within the institution. The type of reward structure is not critical. What is critical is that: 1) a reward structure is identified; 2) the outliers in the reward structure are identified; and 3) the reward structure is evaluated over time in terms of its utility and effectiveness in systematically rewarding those individuals on which the institutions's reputation will rest.

It should be emphasized that a longitudinal study to determine the systematic nature of the reward structure is central to any evaluation of institutional rewards and their effectiveness. It is this systematic nature of the reward structure and its effectiveness in identifying appropriate individuals that determines whether the institution will guide or adapt to society.

Methods for Evaluating Institutional Reward Structures

The identification of criteria for evaluating and rewarding faculty performance is an area of continuing interest in higher education throughout the world. The development and mobility of instructional staff has been described in the literature as it relates to practices in The Netherlands, Poland, Germany, Russia, Israel, Czechslovakia, Switzerland, and the United Kingdom (CEPES, 1981). Katz (1973) has attempted to determine the degree to which postsecondary institutions possess an agreed upon set of criteria by which faculty are evaluated. Other researchers have examined the relationship between faculty rewards and a multitude of variables in a number of different contexts. Faculty salary studies utilizing multiple regression have been conducted within disciplines (Nuemann, 1979; Williams, 1978), within institutions (Braskamp and Johnson, 1978), and at the national level (McLaughlin, Montgomery and Mahan, 1979; Tuckman and Tuckman, 1976). Path analysis procedures have also been used to examine the direct, indirect, and the total influence of hypothesized variables on faculty rewards (McLaughlin, Smart and Montgomery, 1978). Johnson and Stafford (1974) have employed cohort analysis both cross-sectionally and over time to analyze the lifetime earnings of academic economists. Adams and Krislov (1978) have utilized correlational analysis to examine the relationship between faculty salary data and reputation of an institution.

The purpose of this particular study is to identify and to describe the pattern of faculty salary increases over a period of ten years to determine the outliers (both positively and negatively) in terms of increments in salary level and test the systematic nature of the institutional reward structure with regard to these outliers. If evidence can be found to support the hypotheses that these two groups of internally rewarded faculty have been rewarded in a statistically consistent manner over time, then an evaluation of the effectiveness of the reward structure (i.e., in identifying appropriate faculty on whom the institution's external reputation will rest) can take place. If support for this hypothesis can not be found, then the effectiveness of the institutional reward structure in identifying individuals who will guide society in the future is brought into an even more serious focus; and the external reputation of the university is left unanswered by this institutional research approach.

Case Study

The institution of interest in this study was The Florida State University, a public co-educational university located in Tallahassee, the state capital. As a comprehensive graduate research university, the University's current enrollment of 23,000 students (including approximately 19,000 undergraduates and 4,000 graduate and professional students) includes students from every county in Florida, every state in the nation, and 40 foreign countries. The University employs approximately 1,300 instructional and research faculty, including a Nobel Laureate and six members of the National Academy of Science. Since 1976, the nine institutions of the State University System of Florida (of which Florida State is a member) have operated under a collective bargaining agreement which determines, among other matters, the distribution of discretionary and non-discretionary raise allocations.

Data Analysis and Results

Faculty salary data between the academic years of 1972-73 and the 1981-82 were analyzed and the respective percentage increase over this ten-year period was calculated for each instructional faculty member within the collective bargaining unit. The distribution of the cumulative percentage increase for each faculty member during this period was then determined and fifty outliers at each extreme of the distribution were selected for further study. Salary data for these individuals were then collected for each year in the ten-year period and this data base became the source of statistical analysis for this research.

The scatterplots of faculty salary levels across time for each group of faculty outliers are illustrated in Figures 1 and 2.

Bivariate regression analysis was utilized to test the hypothesis that the two groups of faculty outliers had been rewarded in statistically consistent manner in terms of salary increment over time. The results of this initial analyses for the fifty members of the highly-rewarded group indicated that the salary increments had remained consistent over time (R = .815), $p < .001$). The initial analysis for the fifty members of lowly-rewarded group indicated that although the results were statistically significant, their practical significance was brought into serious question (R = .458, $p < .001$). After analyzing the scatterplot for the lowly-rewarded group (see Figure 2), it was determined that this lack of practical significance may have resulted from the large dispersion in the initial salary levels. Therefore, the lowly-rewarded group was divided into three sub-groups with respect to 1972 salary level. The three sub-groups were identified as follows: 1) those faculty with 1972 salaries greater than or equal to \$24,000; 2) faculty members with 1972 salaries between \$19,000 and \$24,000; those faculty with 1972 salaries less than or equal to \$19,000.

An analysis of covariance was then performed for the purpose of increasing the precision of the model on the lowly-rewarded data controlling for differences in 1972 salary levels. After the effect of interaction was determined to be non-significant ($F = 0.19$; $p > .05$), the results of this secondary analysis indicated an improvement in the amount of variance in salary level accounted for by time from appriximately 21% to approximately 80% (R = .896; $p < .001$). It was concluded that support had been found for the hypothesis that the two groups of faculty outliers had been consistently rewarded in terms of salary increments between the academic years of 1972-73 and 1981-82, and further evaluation of the effectiveness of the institutional reward structure would be useful.

DISCUSSION

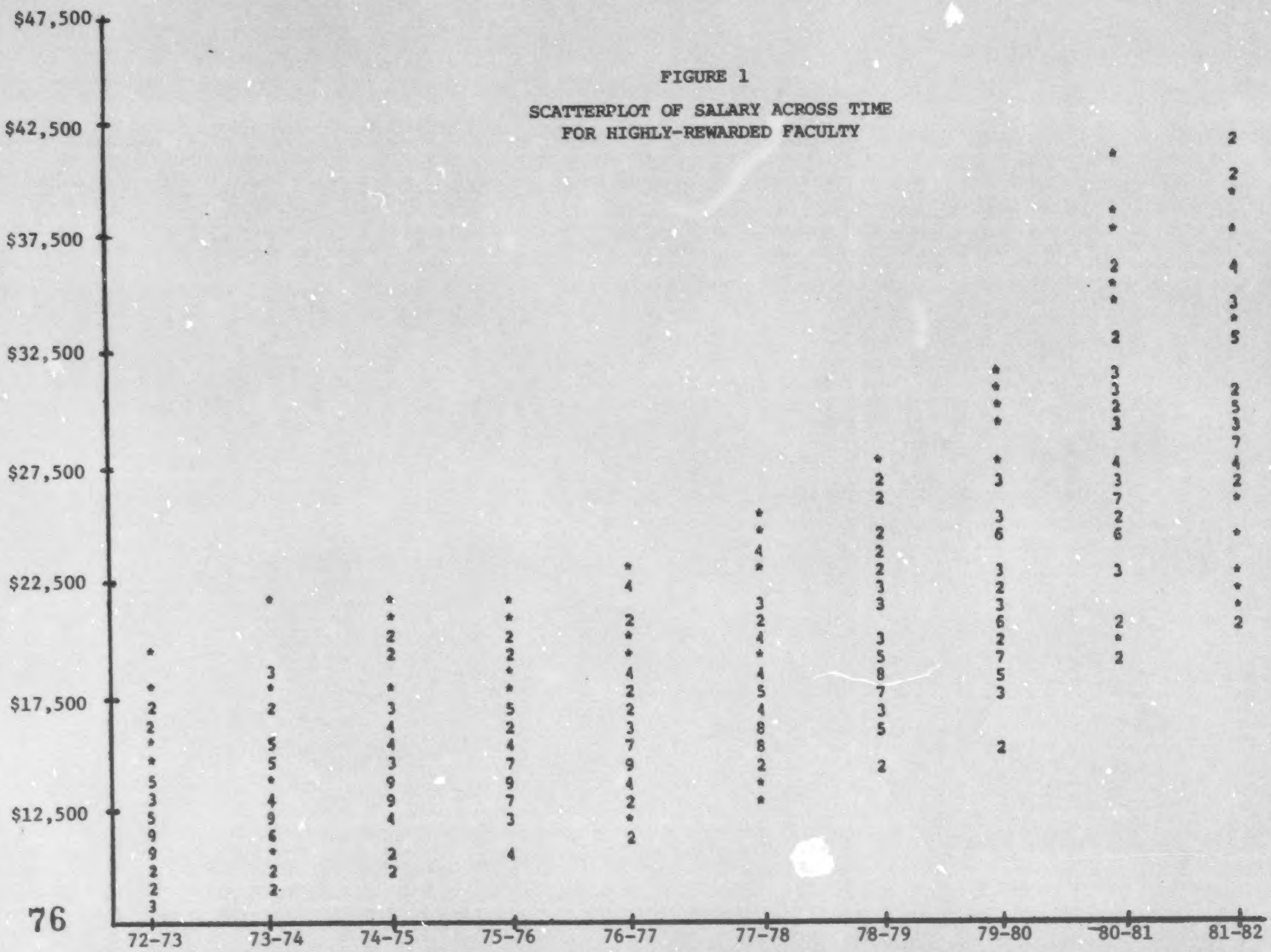
The results of the analysis would seem to indicate the two groups of faculty outliers with respect to salary increments at The Florida State University had been rewarded in a consistent manner over the ten-year period identified in this research. Further analysis would include a more complete investigation of the two groups in general and the individuals themselves in particular. Further investigation employing discriminant analysis would be suggested to assist in identifying the significant characteristics which separate these two groups of faculty outliers. In addition, the analysis of covariance results, which would seem to indicate that three sub-groups exist within the lowly-rewarded group, should be investigated. Other possible analyses would include the identification of cohort groups within the two groups of faculty outliers and the subsequent investigation of the factors resulting in their divergence within the system.

Even though in this particular case further statistical investigation would be useful, it is suggested that the identification of an institutional reward system (or systems) and the patterns that exist within the system over time are extremely important tasks in determining the role of the institution in guiding or adapting to society in the future. If an institutional reward structure cannot be identified through which individuals have been consistently rewarded over time, an institution would seem to be relegated to adapting to the wishes of society with respect to its role in the future.

If, on the other hand, a reward system can be identified through individuals who have been rewarded consistently over time, the question of the utility and

FIGURE 1

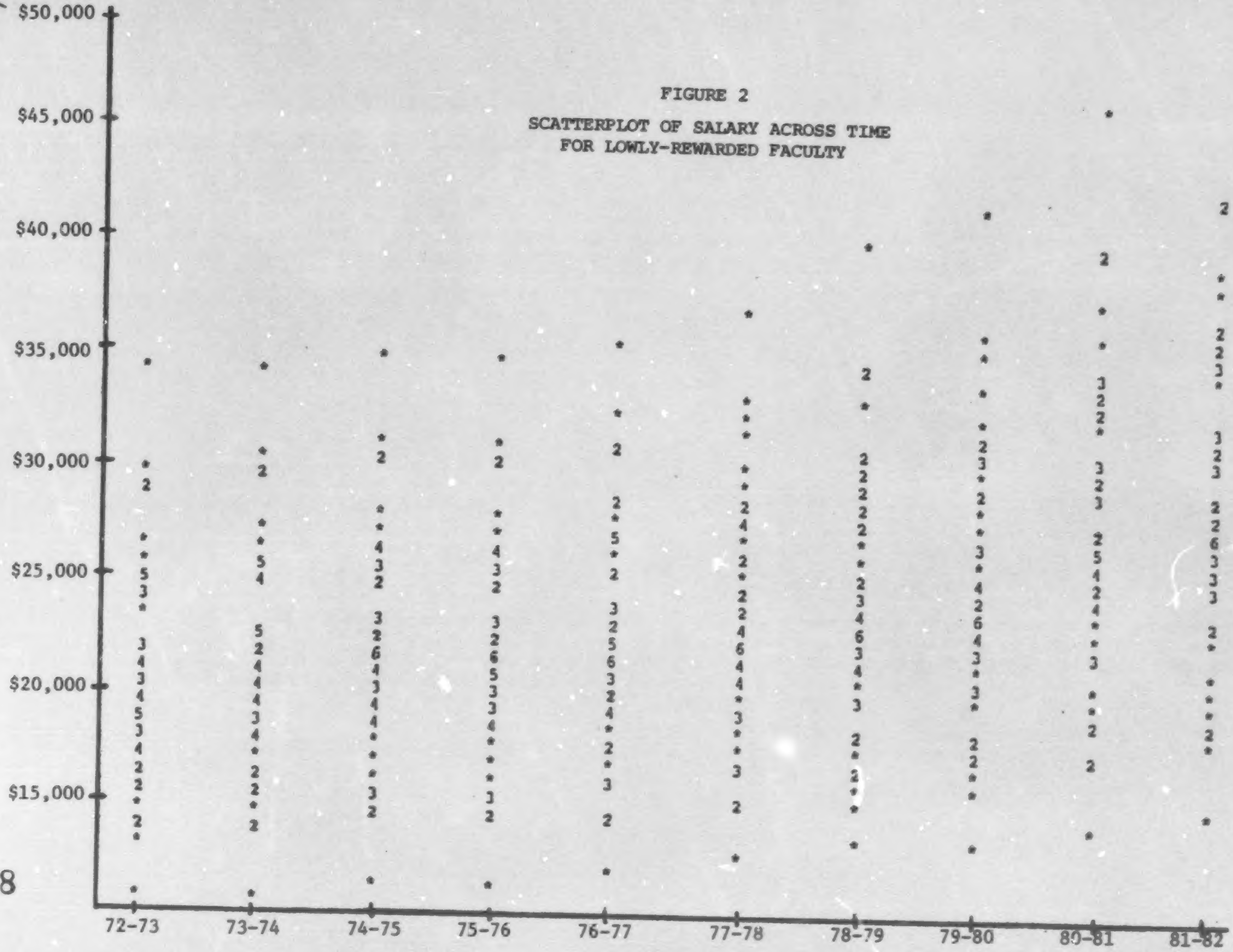
SCATTERPLOT OF SALARY ACROSS TIME FOR HIGHLY-REWARDED FACULTY



76 77

FIGURE 2

SCATTERPLOT OF SALARY ACROSS TIME
FOR LOWLY-REWARDED FACULTY



the effectiveness of the system must be confronted. Institutional research techniques can also be valuable in evaluating these aspects of the reward system. Retention studies for instructional staff could be performed which will assist in the evaluation of the effectiveness of the reward system in retaining those individuals who will help to guide society. Areas of expertise may be identified through an investigation of the two groups of outliers which may assist the institution in focusing its role in the future. The identification of the two groups of outliers and the subsequent evaluation by deans and department chairs with respect to the appropriateness of the individuals included in these groups may result in a change in the pattern of reward within the system so that in the future individuals will be rewarded with respect to their potential for guiding society.

In conclusion, the author would suggest that this type of analysis will not result in an institution becoming a guiding force in society if, in fact, it does not possess the human resources through which to accomplish this goal. It is proposed, however, that through this type of analysis an institution will have the opportunity to identify appropriate individuals on which its reputation will rest and, thereby, greatly enhance its chances to guide society in the future.

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A RESOURCE REQUIREMENTS PREDICTION MODEL FOR THE CENTRAL ADMINISTRATION SUPPORT PROGRAM IN A UNIVERSITY

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INTRODUCTION

The needs of resources for the central administration activities in a university have been analyzed by some authors. Pickford (1975) made an intertemporal and cross-sectional regression analysis of the administration expenditures in a large number of British universities for the period 1966-1971. He found a good relationship between expenditures and the number of students. Verry and Davies (1976) classified students into arts-based and science-based students. The last category was significantly more expensive. Both studies show that increases in organizational size tend to lower unit costs and thus yield economies of scale. R. Bowen (1980) also confirms the existence of economies of scale for the central administration activities. Nevertheless economics will have no effect on total unit costs because institutions will shift any savings to new internal uses - for example creation of new programs, higher quality of programs, etc.

This paper tries to investigate the relationship between the cost of the central administration and academic teaching and research production more thoroughly.

As to these academic outputs there is no widely accepted way to quantify them. So we used input-based quantities as independent variables. Numbers of students or numbers of academic staff are generally accepted as good activity parameters for teaching and teaching-related-research activities (internally financed academic activities). On the other hand the amount of research grants is considered a good index for externally funded research.

We first carried out a cross-sectional and intertemporal regression analysis of the data of a large sample of British universities to find the most appropriate variables determining in a significant way the cost of the central administration. The validity of constant marginal costs is tested by investigating cubic and quadratic cost functions. Finally we obtained a set of relevant cost-equations that estimate the theoretical budget for the central administration program relevant for British institutions.

In a second part we have tried to estimate cost-functions for a Belgian University, using the fixed-variable cost method. The same basic variables are used as in the British equations. Fixed costs were separated from variable costs which were then allocated to the final academic programs by means of an "allocation matrix".

The suitability of the British formula to Belgian Universities was investigated by comparing the coefficients of the corresponding independent variables of the respective cost functions.

DATA SOURCES

The major sources of data for the regression study are the statistics derived by the University Grants Committee (U.G.C.) from the annual returns to the Committee made by the individual universities of the United Kingdom. These data are published every year in the Statistics of Education, Volume 6 (universities).

In order to increase the size of the data sample we made a cross-sectional and intertemporal analysis. The years involved are 1969-70 - 1976-77. The data were adjusted to eliminate the influence of changes in the level of prices over time. The Tress-Brown index for total recurrent expenditures (see Table 1) was used to produce constant price money variables of January 1977.

TABLE 1

EVOLUTION OF TRESS-BROWN INDEX (1)

Year (1st January)	Index
1967	100.2
1968	102.6
1969	107.4
1970	118.4
1971	133.6
1972	144.9
1973	159.9
1974	174.9
1975	212.0
1976	266.0
1977	291.3

(1) Source: Committee of vice-chancellors and principals, index of university cost.

METHODOLOGY AND RESULTS OF THE REGRESSION ANALYSIS

Methodology and approach

We have tried to formulate the relationship between total administration expenditures and one or more activity parameters more precisely by estimating the coefficients of a number of relevant equations each consisting of a different set of independent variables. The regression technique was used to estimate these relationships between costs and output-parameters.

The most natural starting point for estimating equations is the simple linear form with one or more independent variables:

$$TC = a_o + a_1X_1 \quad a_2X_2 \ldots + a_nX_n$$

This total cost function implies that there is a given set-up cost, represented by the constant term a_o and constant marginal costs $a_1, a_1, \ldots a_n$. A positive statistically significant constant term means that the administrative function of a university organization shows economics of scale with the growth of its output volume. The extent of returns of scale in the linear cost function solely depends on the magnitude of the fixed cost term.

Another reason for estimating costs functions is to determine the marginal costs of the different outputs. Marginal costs, as defined in economics, is the change in total cost associated with producing one additional output. If one estimates a regression equation with the number of students as the only independent variable, the regression coefficient of the student-variable represents the marginal (or additional) administrative cost of an additional student. In the case of linear equations marginal costs are constant, thus independent of the output volume. Marginal costs will not generate additional economies of scale. Average administration costs will decline only because the fixed cost is spread over a larger output volume.

The validity of the constant marginal cost hypothesis can also be tested using the regression technique. This is done by adding quadratic and cubic terms to the independent variables of the linear equations. If higher power terms of an independent variable are statistically different from zero, the hypothesis of constant marginal cost is rejected. The exact form of marginal costs will depend on the signs and magnitudes of the higher power regression coefficients.

RESULTS

Linear cost functions

A preliminary drawing of the scatter diagrams indicates a close relationship between central administration expenditures and student numbers (see Figure 1). The diagram also reveals relative high fixed costs. This relationship is not surprising, as is told before student numbers are a good activity-index for the teaching and teaching-related research-activities of a university.

Regression number 1a of Table 2 shows the results of a regression analysis with the number of students (S) as independent variable. The regression coefficient for the student variable and the constant term are both statistically very significant. The high significant value of the constant illustrates important economies of scale. The multiple correlation coefficient (R^2) is high and this means that the estimated equation gives a good fit to the data points. It also confirms the hypothesis that student-numbers are a good overall-index for university outputs.

Better results were obtained in estimating an equation with academic staff (AP) as independent variable (see regression number 1b of Table 2). The multiple correlation coefficient increases from .82 to .86. This demonstrates that academic staff is a better overall-index for internal and external academic activities than students.

Next we investigated the influences on the cost of the central administration program of the internal academic and external activities separately. We estimated an administration cost function specified as follows:

$$TC = a_o + a_1X_1 + a_2X_2$$

FIGURE 1

RELATION BETWEEN CENTRAL ADMINISTRATION EXPENDITURES AND STUDENT NUMBERS

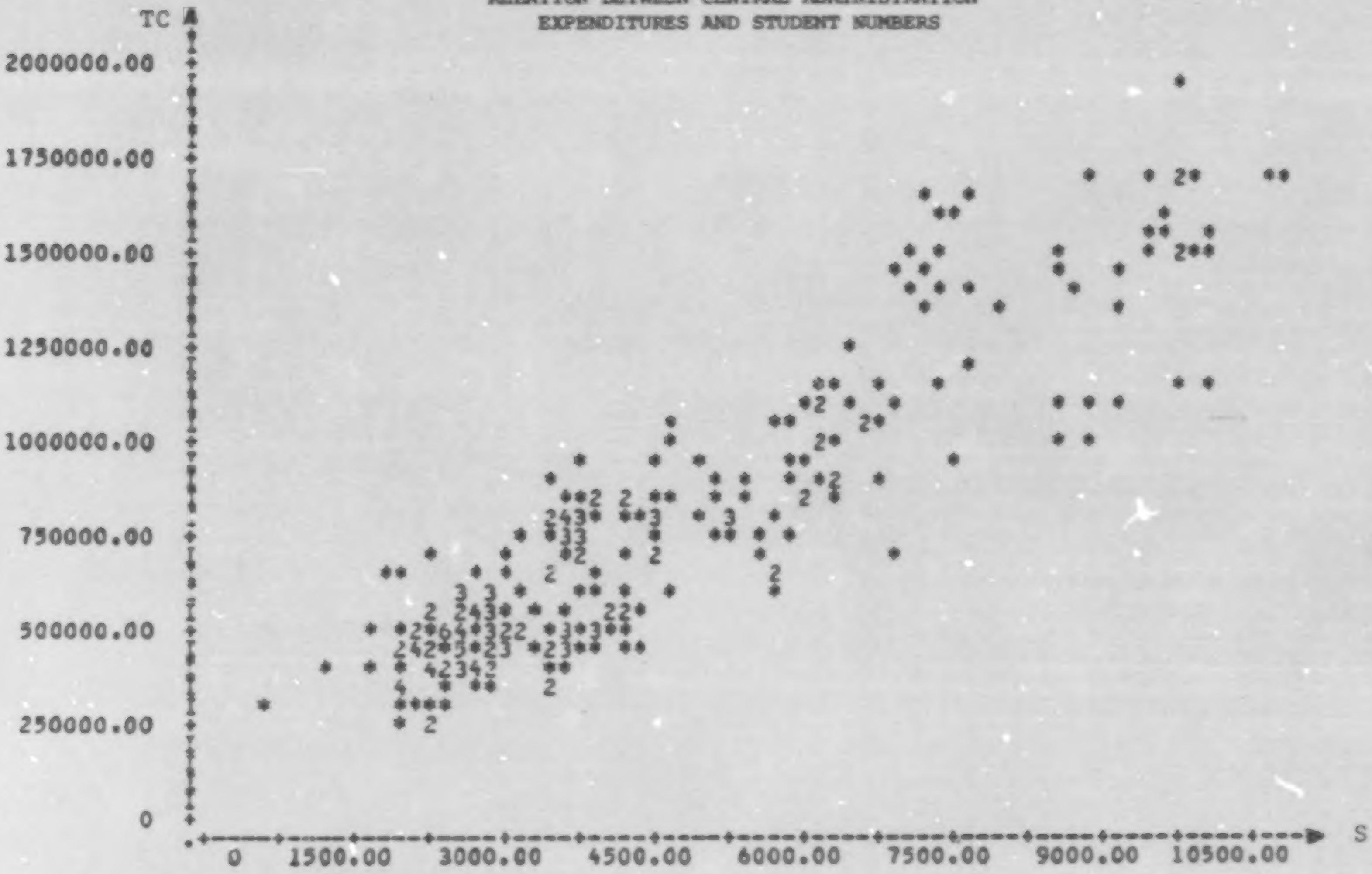


TABLE 2

REGRESSION RESULTS: ESTIMATION OF LINEAR REGRESSION EUQATIONS FOR CENTRAL ADMINISTRATION COSTS IN BRITISH UNIVERSITIES

Regression number	Constant	S	S_a	S_B	CR	R^2	N	F
1_a	125307 (6.01)	147.2 (35.8)	-	-	-	.82	273	$F_{1,271}$=1277.8
2_a	200148 (10.2)	89.9 (12.9)	-		.1483 (9.6)	.87	273	$F_{2,270}$= 899.9
3_a	189998 (9.9)		61.4 (6.4)	127.1 (13.6)	.1515 (10.5)	.88	273	$F_{3,269}$= 671.16
	Constant	AP	AP	AP	CR			
1_b	178683 (10.5)	1192 (41.1)	-	-	-	.86	273	$F_{1,271}$=1692.9
2_b	220533 (13.4)	831.4 (15.2)	-	-	.1153 (7.5)	.89	273	$F_{2,270}$=1046.9
3_b	214600 (12.6)	-	657.8 (6.7)	1020.5 (13.9)	.1198 (8.1)	.89	273	$F_{3,269}$= 732.3

(1) t-values of coefficients are shown in brackets.

The first variable X_1 represents an internal activity variable. Student numbers or academic staff positions were considered as being good parameters for internal academic activities. X_2 represents a variable which is a good index for the externally financed research output. The only measure for these activities available in the U.G.C. statistics was "total expenditures on research grants" (CR), so this variable was entered as X_2 in the cost function. Two cost functions were estimated. The regression results are shown in Table 2 (regression numbers 2a and 2b). These equations give a better fit to the data points than regression numbers 1a and 1b (see increase of multiple R). In both equations the constant term (university set up cost) is very significant. The values of the regression coefficients of the internal variables S or AP became significantly smaller because of the inclusion of an external variable. The value of the coefficient of this last variable in both cost functions illustrates that every 100 pound of research grants expenditures involves extra administration cost between ± 11 and 15 pounds.

Another variable that might explain total administration costs are differences in the mix of fields of study of academic programs. More specifically we were interested in possible different administration requirements of experimental and non-experimental teaching and research activities. To investigate this problem we subdivided the universities' student population (S), academic staff (AP) and research grants (CR) into arts-based (a) and science-based (B) subvariables. So we estimated two cost functions with four independent variables:

$$TC = a_o + a_1 S_a + a_2 S_B + a_3 CR_a + a_4 CR_B$$

$$TC = a_o + a_1 AP_a + a_2 AP_B + a_3 CR_a + a_4 CR_B$$

The regression coefficient of the arts-based external research variable (CR_a) was not statistically different from zero in both equations. Moreover the standard error for CR_B was relatively large compared to the cost functions with an undiferentiated external variable. So we estimated new cost functions with a differentiated internal-activity-variable and one global external research-variable. Regression numbers 3a and 3b of Table 2 show the results of the new estimation. The value of the constant term and the regression coefficient for the external research variable are statistically now different from the values found in regression numbers 2a and 2b. But in both equations - and that is what is of interest in this analysis - arts-oriented and science-oriented internal variables have significantly different regression coefficients. In equation number 3a the marginal cost of a science-student is about the double (2.1) of the marginal cost of an arts-student. The differences with respect to the marginal cost of academic staff variables are less (1.6). These differences can be easily explained. As we know students and academic staff are activity parameters for internal financed teaching and research. The needs for resources like non-academic-staff, operating funds, buildings, ...) per student or per faculty position is much higher in experimental sciences than in human sciences so that an extension in experimental academic programs will result in a larger growth of resources compared to a similar expansion in non-experimental academic programs. As the volume of resources needed for academic activities affects significantly resource-related central administration programs (like personnel and finance administration) extension in both categories of academic activities will result in different extra administration costs.

Testing for non-constancy of marginal costs

Of all equations regression numbers 3a and 3b of Table 2 provided us with the most detailed information concerning those variables that determine significantly the cost of central administration. As these relations are of the linear form marginal costs of the intervening independent variables are constant. Now the hypothesis of constancy will be tested by adding to the linear term of each variable a quadratic and a cubic term. The coefficients of the new cost function are estimated using once again the regression technique.

The cost function to be estimated is specified as:

$$TC = a_{o} + a_1 \; S_a + a_2 \; S_a^2 + a_3 \; S_a^3 + a_4 \; S_B + a_5 \; S_B^2 + a_6 \; S_B^3$$
$$+ a_7 \; CR + a_8 \; CR^2 + a_9 \; CR^3$$

An analogous equation can be specified with academic staff (AP) as internal activity parameter.

A first estimation of the a_i coefficients resulted in higher power coefficients for the external research variable which were statistically not different from zero. This proves that the marginal cost of the research grants variable is constant. So we re-estimated a new cost function with only a linear term for the external research variable. Except for the regression-coefficient of S_B all coefficients were significant at the 5% level. The results of the last estimation of a function without S_B are listed in Table 3. (See regression number 6a).

The constant term is still significant although its value decreases. Also the coefficient of the external research variable keeps the same value as found in the linear equations (between .12 and .15). As the coefficients of the cubic and quadratic terms are statistically significant marginal costs of a- and B-variables are non-constant. The marginal cost of a variable is calculated by taking the partial derivative of the total cost function with respect to that variable. The marginal cost function for both a and B internal activity variables are illustrated diagrammatically in Figure 2. As one can see the shape of the two functions is totally different. For arts-based students the marginal cost function is a U-shaped curve with a minimum cost for universities having student numbers between 2 400 and 3 600 students. The marginal cost in science-disciplines first rises with growth in student numbers and reaches a maximum value at size of ± 3 200 students. Further growth will involve lower marginal costs.

As the cost functions were derived from a sample of universities with student numbers not exceeding 11 000 students (respectively 5 500 students for S_a and S_B) results are only relevant for universities with a size below these limits. Application of the cost function to larger universities will lead to unacceptable results. So it is not very clear how administration costs evolve as a result of further growth avoce the limits.

An analogous cubic cost function with academic staff as internal variable was estimated (results see regression number 6b of Table 3).

TESTING THE SUITABILITY OF THE BRITISH EQUATIONS TO BELGIAN UNIVERSITIES

In this section we will explain the procedure followed in developing a set of cost equations appropriate for a Belgian university (in this case our own

TABLE 3

REGRESSION RESULTS: ESTIMATION OF CUBIC COST FUNCTIONS FOR CENTRAL ADMINISTRATION IN BRITISH UNIVERSITIES

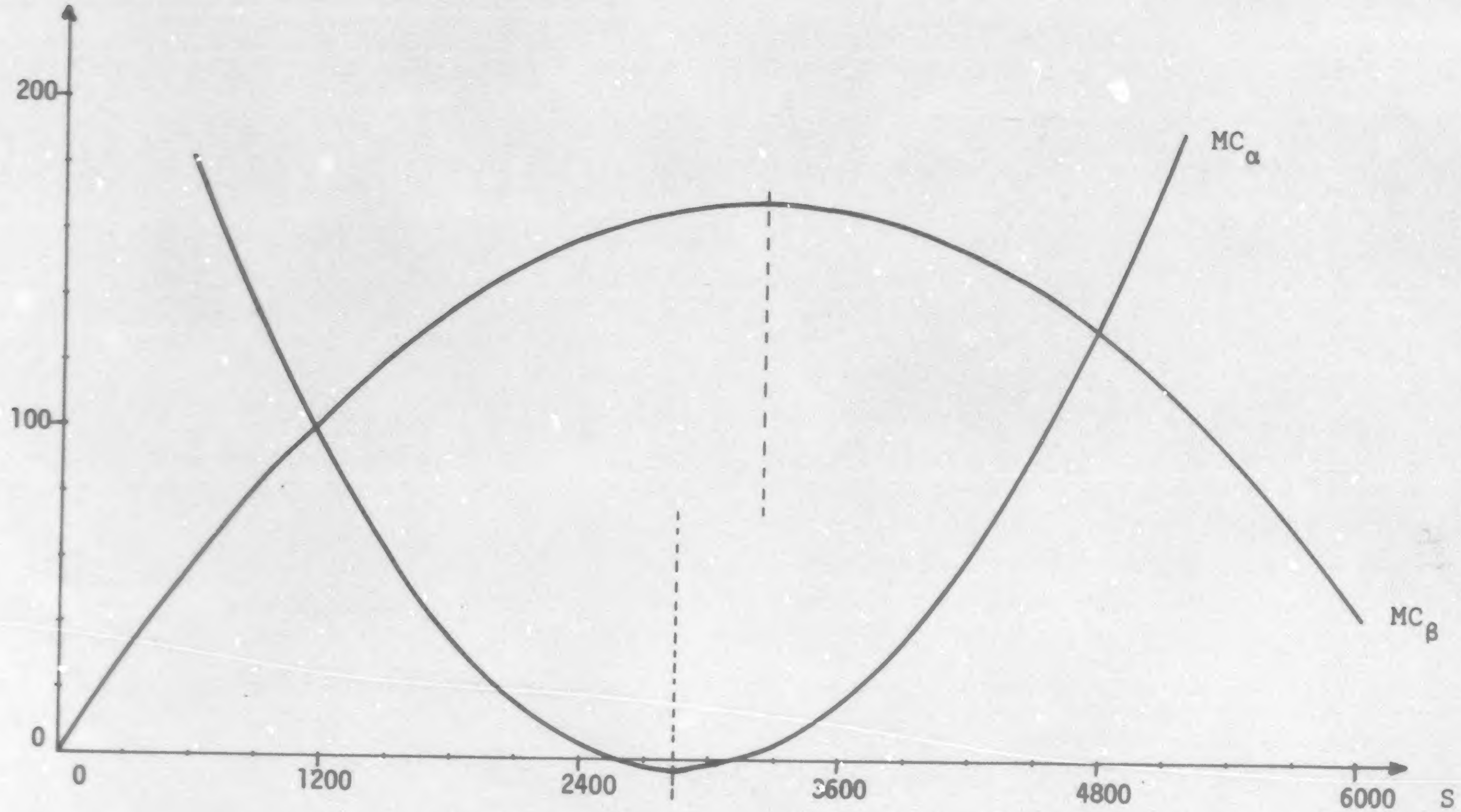
Nr.	Constant	S_a	S	S_B	S_a^2	S^2	S_B^2	S_a^3	S^3	S_B^3	CR	R^2	F
4_a	347.555 (16.3)					.0278 (12.7)			-1.548×10^{-6} (7.0)			.83	$F_{2,270} = 654.7$
5_a	341.232 (18.3)					.0167 (7.3)			$- .888 \times 10^{-6}$ (4.4)		.1440 (9.1)	.87	$F_{3,269} = 596.6$
6_a	142 974 (2.8)	291 (3.9)			-.1033 (3.1)		.0527 (7.1)	$.122 \times 10^{-4}$ (3.0)		$-.543 \times 10^{-5}$ (3.6)	.1479 (10.0)	.89	$F_{6,266} = 361.2$
	Constant	AP_a	AP	AP_B	AP_a^2	AP^2	AP_B^2	AP_a^3	AP^3	AP_B^3	CR		
4_b	367.297 (22.0)					2.103 (16.8)			$- .1066 \times 10^{-2}$ (10.3)			.87	$F_{2,270} = 872.2$
5_b	351.921 (22.6)					1.520 (10.6)			$- .0771 \times 10^{-2}$ (7.4)		.1084 (6.9)	.89	$F_{3,269} = 696.1$
6_b	147.312 (3.4)	2980 (4.6)			-11.27 (3.8)		4.311 (11.5)	.0154 (4.1)		$-.460 \times 10^{-2}$ (7.7)	.1177 (8.3)	.90	$F_{6,266} = 410.6$

(1) N (=number of observations) = 273

(2) t-values of regression coefficients are shown in brackets.

FIGURE 2

EVOLUTION OF MARGINAL COSTS OF a- and B STUDENTS



institution V.U.B.) and which apply the same basic variables found significant in the regression equations developed for British universities. The suitability of last equations to Belgian universities is investigated by comparing the coefficients of the corresponding independent variables of the respective cost functions.

Methodology for estimating a Belgian cost function and results

We developed a central administration cost function with data of the V.U.B. using the fixed variable cost method that can be summarized as follows:

- classification of central administration activities into a number of relevant administration support programs;
- a separation of fixed from variable costs for each of the administrative programs;
- allocation of variable costs to academic teaching and research programs.

Classification of central administration activities

A classification of central administration activities into a number of functional administration programs is necessary to simplify the separation of fixed and variable costs and to obtain self-evident cost allocation keys.

These administrative programs can in their turn be classified into the following main categories:

a) "Resource administration programs". These programs are occasioned by the use of resources in a university in the form of academic staff and operating funds. They consist of:

   - personnel administration program
   - financial administration program
   - administrative data processing

b) "Academic activity administration programs". Teaching and research give rise to:

   - instruction administration
   - research administration

c) "Academic student administration program". This program is occasioned by the participation of students in academic activities. Administration work due to social student services activities are not included in this program.

d) "General management program". These activities include administrative and academic leadership, planning activities, institutional research and so on. They are a result of the overall activities in a university.

By classifying central administration activities in this way one gets very self-evident allocation keys to assign the costs of most of these programs to the final academic outputs.

Separation of fixed from variable costs

For each activity category fixed costs were separated from variable costs. Of course the fixed or variable nature of costs cannot be determined empirically, so this step is almost entirely a political and judgmental matter. In general salaries relating to administrative leadership and equipment costs were considered as fixed while wages of executive (clerical) personnel were treated as variable costs. Columns a and b from Table 4 give for each administrative program the fixed and variable components.

Allocation of variable costs to academic teaching and research programs

Fixed costs were excluded from the analysis and the variable administration costs were allocated to academic teaching and research programs.

Resource administration programs give administrative support to any university program. This means that they administrate resources used for teaching and research purposes as well as resources used in academic support programs (libraries, computer centers, physical plant operations...) and that they also give administrative support to themselves, e.g. the salary and wage administration also pays the wages of staff belonging to the accounting department, purchasing office, academic staff administration. And the financial administration office also administrates budgets of academic and non-academic administration offices and of the administrative data processing department.

To take full account of these mutual support relations that exist between resource administration programs we used a cost allocation matrix (C.A.M.) for allocating the costs of these programs to a number of intermediate programs consisting of:

- the remaining categories of administration programs (academic activity administration, student administration, general management);
- resource administration programs for administration of resources used in teaching and research activities;
- resource administration programs for administration of resources used in academic support programs.

A coefficient a_{ij} of this matrix (A) represents the share of program i in the total consumption of support services provided by program j. The coefficients of the inverse matrix $(I-A)$ allocate the direct costs of the resource administration programs to the intermediate programs. The results of this allocation are shown in column c of Table 4.

The variable costs assigned to each of the intermediate administration programs were then further allocated to the academic teaching and research programs using the most appropriate allocation key for each program (see list below).

administration of instruction----------------------	teaching volume
student administration------------------------------	number of students
research administration-----------------------------	cost of research
administration of academic staff--------------------	number of academic staff
administration of non-academic staff----------------	number of non-academic staff

TABLE 4

ALLOCATION OF CENTRAL ADMINISTRATION COSTS TO ACADEMIC TEACHING & RESEARCH PROGRAMS
FREE UNIVERSITY BRUSSELS - 1978 (IN BELGIAN FRANCS I 1000)

Administration program	Direct costs		total of allocated costs (d)	Allocation of costs to final academic programs		
	fixed (a)	variable (b)		arts-teaching research (d)	science teaching research (e)	external funded research (f)
Personnel administration	3 850	9 208				
Financial administration	5 841	19 175				
Administrative data processing	1 343	20 653				
Administration of instruction	898	3 059	3 248	1 267	1 981	-
Student-administration	1 200	2 197	2 325	1 186	1 139	-
Research administration	1 216	5 715	6 157	739	2 709	2 709
Top management	13 043	9 676	11 925	2 027	6 082	3 816
Resource administration of academic activities						
Admin. of academic staff			6 414	1 887	3 503	1 024
Admin. of non academic staff			5 134	660	3 464	1 010
Admin. of operating funds			26 755	1 946	11 028	13 781
Resource administration of support programs						
Physical plant			4 931	937	3 994	-
Libraries			2 466	1 036	1 430	-
Computer center			243	32	211	-
Others			85	85	-	-
TOTALS	27 391	69 683	69 683	11 802	35 541	22 340

physical plant-- number of square foot
libraries-- books, periodical budget
computer center--------------------------------------- used computer time

Finally we divided the total amount of allocated costs of each program by the value of the activity parameter relevant for that program. According to the regression equations estimated in Table 2 for British universities we obtained six corresponding equations for the V.U.B.:

1_a $TC = 27391000 + 15112(S)$
1_b $TC = 27391000 + 139088(AP)$
2_a $TC = 27301000 + 10267(S) + .1111(CR)$
2_b $TC = 27391000 + 94497(AP) + .1111(CR)$
3_a $TC = 27391000 + 5009(S_a) + 15760(S_B) + .1111(CR)$
3_b $TC = 27391000 + 71527(AP_a) + 105777(AP_B) + .1111(CR)$

Comparison of the Belgian with the British equations

Table 5 compares the coefficients of the corresponding independent variables of the British linear regression equations with the respective Belgian cost functions. Column b of that Table shows the regression coefficient of the British cost functions expressed in Belgian francs of 1977. The coefficients of the internal variables - differentiated or not into a and B subvariables - and the constant terms of the equations estimated in Table 2 were converted into Belgian currency. For this we used a conversion rate, representing the relation between unit labour costs in Belgium and in the United Kingdom for 1977 (115 BF/ £). The regression coefficient of the external research variable (CR) can be considered as a percentage of that independent variable so that no conversion is needed here. The parameters of the Belgian equations were also adjusted to the price level of 1977 (see column a).

Cost functions with academic staff as independent internal variable generally give better results compared to equations with number of students as activity parameter. This conclusion is consistent with the results found in the regression analysis where multiple correlation coefficients were better for the first category of equations. In fact for equation numbers 1b, 2b, and 3b the constant terms and the external-research coefficients of the regression equations and the Belgian cost functions are of the same size, whereas differences between these coefficients in the corresponding "student-equations" (1a, 2a and 3a) are much bigger.

In both kind of cost functions science students or academic staff require more central administration expenditures than arts students or faculty. However, the difference between cost deviations is more important in "student equations" (3a) than in "faculty equations" (3b). Cost differences between a and B academic staff are in the last category of equations nearly the same in British as in Belgian cost functions (about 70%).

Testing the suitability of the nonlinear regression equations was not possible because the Belgian cost function refers to one year only (1978). The estimation of parameters for several years seemed impossible because of the lack of enough detailed data.

TABLE 5

VALUES OF THE COEFFICIENTS OF BRITISH LINEAR REGRESSION EQUATIONS AND BELGIAN COST FUNCTIONS EXPRESSED IN BELGIAN FRANCS OF 1977

Equation number	Parameter	VALUES IN	
		Belgian cost-functions (a)	British regression equations (b)
1_a	constant S	26 216 000 14 464	14 410 000 16 933
1_b	constant AP	26 216 000 133 121	20 549 000 137 103
2_a	constant S CR	26 216 000 9 827 .1111	23 017 000 10 343 .1483
2_b	constant AP CR	26 216 000 90 443 .1111	25 361 000 95 605 .1153
3_a	constant S_a S_B CR	26 216 000 4 794 15 085 .1111	21 850 000 7 064 14 621 .1111
3_b	constant AP_a AP_B CR	26 216 000 68 459 101 239 .1111	24 679 000 75 644 117 353 .1198

CONCLUSIONS

One overall conclusion that can be drawn from this study is that resources needed for the central administration program in a university are related to student numbers in a more indirect way than a mere proportionality.

First a significant part of total costs is fixed and do not depend on any activity parameter. This fixed cost component may be interpreted as the setting-up cost of a university administration prior to the first admission of students. These fixed costs consist mainly of salary expenditures for the leadership function of the different administration programs.

Secondly other variables than only student number influence the central administration requirements. This is true for the granted research activities and for the mix of fields of studies in a university. Granted research activities involve higher administration expenditures than teaching and teaching-related-research activities. So we found in the cost analysis for the Belgian university that administration cost as a percentage of academic expenditures amounted to about 11% for granted research activities versus 6% for university funded activities. Experimental academic activities (represented by number of students or academic staff) require a more expensive central administration than non-experimental activities. But cost differences per student or faculty member are mainly the result of higher requirements of academic resources for the first category of activities.

Finally we found that marginal costs with respect to internal activity parameters are non-constant. The shape of the marginal cost function for a-disciplines is of a U-shaped form with minimum costs at a size of about 3 000 students. For experimental activities the marginal cost function implies that small or large universities bear the brunt of expansion and those in the medium range have the highest marginal costs. Due to the composition of the data sample results are only relevant for universities with a size below 11 000 students.

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PRESENTATION OF TEN COST INDICATORS IN TERMS OF HOURS OF ACTIVITIES

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INTRODUCTION

In March 1981, the UCL Academic Council asked the Service d'Etudes to provide it with comparative data on costs per student in the different schools of the University. Furthermore, within the context of measures for curbing the budget deficit, there have been signs of a growing interest in the analysis of the costs of teaching programmes.

An analysis of the unit costs of teaching programmes cannot be improvised. It must be based on a sound method which is universally accepted. It must also - and this is a heavier task - use reliable data.

By restricting oneself to the costs of teaching, one can subdivide the analysis into four main stages:

1. An analysis of the teaching hours ascribable to the different programmes, taking into account the students' attendance.
2. An analysis of the teaching personnel costs, directly linked to the teaching hours.
3. An analysis of the other direct costs of teaching: services of administrative and technical personnel, operating expenses, computer time.
4. An analysis of the indirect costs of teaching, that is to say ascription of scientific and material logistics expenses, and general administration expenses.

Cautiousness, intelligibility and efficiency have led us to tackle these four stages separately. Each of them makes, moreover, its own practical and methodological demands. Only the first of these stages is therefore presented below.

Even though it is limited, this study contains many imperfections. We express below several reservations to which we invite the reader to pay particular attention.

However, these reservations do not weaken the basic interest of the method developed or the figures quoted: as the hour of activity (lecture, exercises, seminars, etc.) remains the main determinant of teaching costs, an analysis of programmes in terms of organized hours already enables us to establish an important connection between academic and financial concerns.

GENERAL TECHNICAL CONSIDERATIONS

1. The source data used in this study are included in the course file for the academic year 1978-79.

   - the list of courses at the UCL, with each of them being allotted its volume of hours (hours of lectures, exercises and seminars);

   - the number of students attending these courses, divided between their years of studies (data collected from the school secretaries).

2. As far as exercises are concerned, one serious limitation of the study is that it does not take into account series. This is why only the indicators relating to lectures are presented in detail, whereas the indicators relating to all types of teaching are only presented if they have a significance which is relatively independent of these numbers of series.

PRESENTATION OF INDICATORS: COMPARATIVE TABLES OF SCHOOLS [a] AND CYCLES [b]

1. STUDENT NUMBERS (N)

The student numbers are the numbers of students registered in the years of studies under consideration.

	TECO	ISP	DRT	ESPO	FLTR	PSP	MD	SC	FSA	AGRO	OTHERS	UCL
1er cycle	87	170	324	826	514	420	2,052	1,036	532	362	-	6,323
2e cycle	56	60	1,238	1,202	639	251	2,736	398	718	256	54	7,608
3e cycle	5	-	44	177	43	41	457	211	36	80	-	1,094

2. STUDENT HOURS (XC)

Explanation

Every time a student follows one hour of his course, we count one student hour.

- for a course:

  Student hours = (volume of hours [c]) x (number of students on the course). We total the student hours of all the courses concerned, but only take into account students in the year of studies under consideration.

- for several years of study:

  We total the student hours of the years of studies involved.

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[a] For the meaning of these abbreviations "TECO", "ISP", ... used for the schools, see the appendix.

[b] The expression "1er cycle", "2e cycle", "3e cycle" used for the tables respectively mean "1st level", "2nd level", "3rd level".

[c] We shall always be concerned below with the yearly volume of hours.

	TECO	ISP	DRT	ESPO	FLTR	PSP	MD	SC	FSA	AGRO	OTHERS	UCL
Lectures												
1er cyc.	41,070	47,610	162,472	323,909	249,058	203,512	1,026,555	401,030	154,962	151,148	-	2,761,326
2e cyc.	18,210	20,865	525,356	406,010	197,091	112,300	1,009,316	109,518	259,294	98,601	19,492	2,776,053
3e cyc.	1,410	-	15,180	22,957	1,440	-	35,089	4,710	2,362	8,515	-	91,653
All types of teaching												
1er cyc.	43,950	53,604	226,032	388,439	267,253	238,612	1,637,205	716,242	384,888	284,129	-	3,595,726
2e cyc.	20,310	25,665	648,220	496,431	210,[illegible]96	141,882	1,435,502	207,096	453,697	180,628	27,242	3,847,242
3e cyc.	1,710	39	16,788	28,859	1,680	-	163,611	12,804	2,362	13,699	-	241,552

REMARKS

The student hours are an indicator of what we could call the volume of production of a course or of a year of studies.

For lectures, a very high number of student hours can correspond to very few hours (if there are many students per course); for exercises, this is not usually the case (because several series have to be organized).

3. THE HOURS OFFERED (HO)

For one or more years of studies, this is the sum total of the volumes of hours of the courses followed by at least one student in this (or these) years of studies.

	TECO	ISP	DRT	ESPO	FLTR	PSP	MD	SC	FSA	AGRO	OTHERS	UCL
Lectures												
1er cycle	2,430	1,748	2,198	2,490	5,775	983	6,618	4,333	1,170	850	-	-
2e cycle	3,855	1,470	4,598	14,423	11,963	4,673	12,196	7,920	11,096	5,381	-	-
3e cycle	1,110	-	1,485	3,165	960	-	2,248	1,790	1,613	3,720	-	-
All types of teaching												
1er cycle	2,760	1,948	2,661	3,033	6,345	1,178	8,659	7,026	2,820	1,542	-	-
2e cycle	4,605	1,890	5,875	18,473	13,195	6,191	16,418	13,429	20,693	9,325	2,163	-
3e cycle	1,380	360	1,689	4,093	1,125	-	8,429	2,714	2,733	5,883	-	-

Note: For exercises, we do not take into account subdivisions into parallel series.

REMARKS

One can assume that we are dealing here with the volume offered to the student in one year of studies.

However, the term is not very strict, because some courses which are actually offered will not be counted if no student has chosen them.

Furthermore, this indicator is probably over-sensitive to the choice made by a small number of students, which can lead to considerable, but random changes from one academic year to another.

NOTE

The hours offered for a set of years of studies are not equal to the sum total of the hours offered in these years of studies (because one course, offered to several of these years of studies, must only be counted once for the whole set).

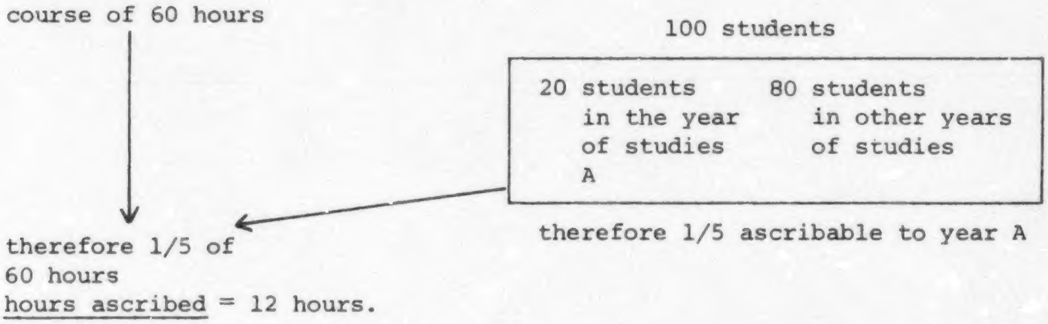
4. THE HOURS ASCRIBED (HI)

Explanation

For one year of studies, we take all the courses followed by at least one student in this year of studies, but for each course, we only ascribe part of its volume of hours, given by the proportion of students attending it who are students in that year.

For several years of studies, we add together the hours ascribed to the different years of studies.

example:


course of 60 hours
100 students
20 students in the year of studies A
80 students in other years of studies
therefore 1/5 ascribable to year A
therefore 1/5 of 60 hours
hours ascribed = 12 hours.

	TECO	ISP	DRT	ESPO	FLTR	PSP	MD	SC	FSA	AGRO	OTHERS	UCL
Lectures												
1er cycle	1,700	765	1,556	2,180	4,651	932	5,737	3,190	1,092	624	907	22,427
2e cycle	2,305	692	3,894	9,965	8,173	2,276	9,544	5,733	7,471	4,068	907	55,028
3e cycle	298	-	787	1,316	190	-	1,738	1,196	527	706	-	6,758
All types of teaching (x)												
1er cycle	1,885	906	1,933	2,656	5,189	1,127	7,872	5,755	2,730	1,165	-	31,218
2e cycle	2,791	970	5,040	13,204	8,938	3,558	12,883	9,974	15,158	7,295	1,080	80,991
3e cycle	426	104	926	1,842	285	-	7,589	1,919	869	1,008	-	14,968

(x) Where exercises are concerned, the concept of hours ascribed does not give a correct indicator of cost, because it does not take "series" into account. It could however be of some interest if our concern was not to record hours of "titulariat" (for which only one series is usually taken into consideration).

REMARKS

The concept of hour ascribed is very important. It is by using this that we can divide up the cost of each course among the different years of studies which use it.

5. (YEARLY) AVERAGE STUDENT HOUR LOAD (HM)

Explanation

Using the data at our disposal, the average student hour load is recalculated as follows:

For one or more years of studies:

$$\text{Average student hour load} = \frac{\text{student hours (XC)}}{\text{number of students (N)}}$$

	TECO	ISP	DRT	ESPO	FLTR	PSP	MD	SC	FSA	AGRO	OTHERS	UCL
Lectures												
1er cycle	472	280	501	392	485	485	500	387	291	418	-	437
2e cycle	325	348	424	338	308	447	369	275	361	385	361	365
3e cycle	282	-	345	130	33	-	77	22	67	106	-	84
All types of teaching												
1er cycle	505	315	698	470	520	568	798	691	723	785	-	569
2e cycle	363	428	513	412	330	565	525	520	632	706	504	505
3e cycle	342	50	382	156	34	-	358	61	66	171	-	221

REMARKS:

The concept of average student hour load is very simple and well known. The way in which this load is calculated here is, however, unusual: the reason for this is the nature of the data available (see the general technical considerations). As this load is generally known from another source, we thus have at our disposal a means of checking the data used.

The student hour load is obviously one of the important factors which explain the cost of study programmes.

6. AVERAGE NUMBER OF STUDENTS PER COURSE (MC)

Explanation

For one or more years of studies, we shall use the following calculating method:

$$\text{Average number of students per course} = \frac{\text{student hours (HX)}}{\text{hours ascribed (HI)}}$$

We can show that this formula, which only uses, in both the numerator and the denominator, the part ascribable to the year (or years) of studies under consideration, gives a correct measure which is compatible with the cost analyses.

	TECO	ISP	DRT	ESPO	FLTR	PSP	MD	SC	FSA	AGRO	OTHERS	UCL
Lectures												
1er cycle	24	62	104	149	54	218	179	126	142	242	-	123
2e cycle	8	30	135	41	24	49	106	19	35	24	21,4	50
3e cycle	5	-	19	17	8	-	20	4	4	12	-	14
All types of teaching												
1er cycle	As the number of series of exercises is not taken into consideration, the average number of students per course would be of no concrete useful significance here.											
2e cycle												
3e cycle												

REMARKS

The average number of students per course is also, at least as far as lectures are concerned, an important factor in the cost of programmes.

7. RATE OF DIVERSITY (D)

Explanation

For one or more years of studies, the rate of diversity is defined as the ratio between what is offered to the students and what it would strictly suffice to offer them, in the absence of all diversity.

$$\text{Rate of diversity} = \frac{\text{hours offered (HO)}}{\text{average student hour load (HM)}}$$

Example of a year of studies:

- The average student timetable (HM) is 450 hours.
- 1 350 hours are followed by at least one student in this year of studies (HO = 1 350)
- The rate of diversity (D) is therefore $\frac{1\ 350}{450} = 3$

	TECO	ISP	DRT	ESPO	FLTR	PSP	MD	SC	FSA	AGRO	OTHERS	UCL
Lectures												
1er cycle	5,1	6,2	4,4	6,3	11,9	2,0	13,2	11,2	4,0	2,0	-	-
2e cycle	11,9	4,2	10,8	42,7	38,8	10,4	33,0	28,8	30,7	13,9	-	-
3e cycle	3,9	-	4,3	24,4	28,7	-	29,3	80,2	24,6	34,9	-	-
All types of teaching												
1er cycle	5,5	6,2	3,8	6,4	12,2	2,1	10,9	10,2	3,9	2,0	-	-
2e cycle	12,7	4,4	11,4	44,8	40,0	11,0	31,3	25,8	32,7	13,2	-	-
3e cycle	4,0	7,2	4,4	26,2	33,5	-	23,5	44,7	26,0	34,4	-	-

REMARKS

One can note that the rate of diversity cannot be lower than 1. Its value can be very high, in those cases where the students' choices are spread over a large number of courses.

In the case of a set of several years of studies, the rate of diversity can only be assessed by reference to the number of organized years of studies.

8. RATE OF SHARING (P)

Explanation

For one or more years of studies, the rate of sharing is defined as the ratio between what is offered to the students, and the part ascribable to the year (or years) of studies under consideration.

$$\text{Rate of sharing} = \frac{\text{hours offered (HO)}}{\text{hours ascribed (HI)}}$$

Indeed, it is only because certain courses are shared with other years of studies, that only part of the hours offered are ascribed to the year (or years) of studies under consideration.

	TECO	ISP	DRT	ESPO	FLTR	PSP	MD	SC	FSA	AGRO	OTHERS	UCL
Lectures												
1er cycle	1,4	2,3	1,4	1,1	1,2	1,0	1,2	1,4	1,0	1,4	-	-
2e cycle	1,7	2,1	1,2	1,4	1,5	2,0	1,3	1,4	1,5	1,3	-	-
3e cycle	3,7	-	1,9	2,4	5,0	-	1,3	1,5	3,0	5,3	-	-
All types of teaching												
1er cycle 2e cycle 3e cycle	The rates of sharing are not given here, because they use HI (see 4)											

REMARKS

We can note that the rate of sharing cannot be lower than 1. Its value can be very high, in those cases where the students' choices are very varied (HO high) but where they fall on courses in which students of other years are in the majority (HI low).

At the level of a whole faculty, the rates of sharing are rarely high, as most of the sharing most often takes place within the one same faculty.

9. LOAD COEFFICIENT (C)

Explanation

For one or more years of studies, the load coefficient is defined as the ratio between what is ascribable to them and what would strictly suffice to satisfy the student's hour load.

$$\text{Load coefficient (C)} = \frac{\text{hours ascribed (HI)}}{\text{average student hour load (HM)}}$$

	TECO	ISP	DRT	ESPO	FLTR	PSP	MD	SC	FSA	AGRO	OTHERS	UCL
Lectures												
1er cycle	3,6	2,7	3,1	5,6	9,6	1,9	11,5	8,2	3,7	1,5	-	51.3
2e cycle	7,0	1,9	9,2	29,5	26,5	5,0	25,9	20,8	20,7	10,6	2,5	150,8
3e cycle	1,0	-	2,3	10,1	5,7	-	22,6	53,6	8,0	6,6	-	80,5
All types of teaching												
1er cycle	3,7	2,9	2,8	5,6	9,9	1,9	9,9	8,3	3,7	3,2	-	54,9
2e cycle	7,7	2,3	9,8	32,0	27,1	6,3	24,6	19,2	23,9	10,3	-	160,1
3e cycle	1,2	2,0	2,4	11,8	8,5	-	21,2	31,6	8,0	5,9	-	67,7

REMARKS

1. In the case of a year of studies in which all courses are compulsory, and in which there is no sharing of courses with other years of studies, the load coefficient is equal to 1.

2. The load coefficient of one year of studies can be higher than or lower than 1, depending on whether diversity or sharing predominates. (The detailed table is available from the author.)

3. When we are dealing with a set of several years of studies, the load coefficient can only be assessed by reference to the number of years of studies under consideration, as was also the case with the rate of diversity.

10. HOURS ASCRIBED PER STUDENT (CE)

Explanation

For one or more years of studies, we simply have:

$$\text{Hours ascribed per student} = \frac{\text{hours ascribed (HI)}}{\text{number of students (N)}}$$

	TECO	ISP	DRT	ESPO	FLTR	PSP	MD	SC	FSA	AGRO	OTHERS	UCL
Lectures												
1er cycle	20	5	5	3	9	2	3	3	2	22	-	3,5
2e cycle	41	12	3	8	13	9	3	14	10	16	17	7,2
3e cycle	60	-	18	7	4	-	4	6	15	9	-	6,2
All types of teaching (x)												
1er cycle	22	5	6	3	10	3	4	6	5	3	-	-
2e cycle	50	16	4	11	14	14	5	25	21	28	-	-
3e cycle	85	3	21	10	6	-	17	9	24	13	-	-

(x) Does not take into account parallel series of exercises.

REMARKS

1. This indicator is the most synthetic one of the sequence presented. It is close to the notion of cost per student, insofar as the course hours are a basic determinant of teaching costs. Let us recall, however, that at this stage in our work, series of exercises have not been taken into account (what we have is therefore a rough indicator of the cost of "titulariat").

2. The definitions of the different indicators have given us a coherent set of formulae, which enables us to express CE in two ways which quantitatively bring out the factors which explain the cost of the student (see Figure 1).

a) $CE = \frac{C \times HM}{N}$

The cost per student (in terms of hours ascribed)

- is directly proportional to the load coefficient (C), which is itself equal to $\frac{D}{P}$
- is directly proportional to the average student hour load (HM)
- is inversely proportional to the number of students (N).

All in all,

HM
C
N
explain CE

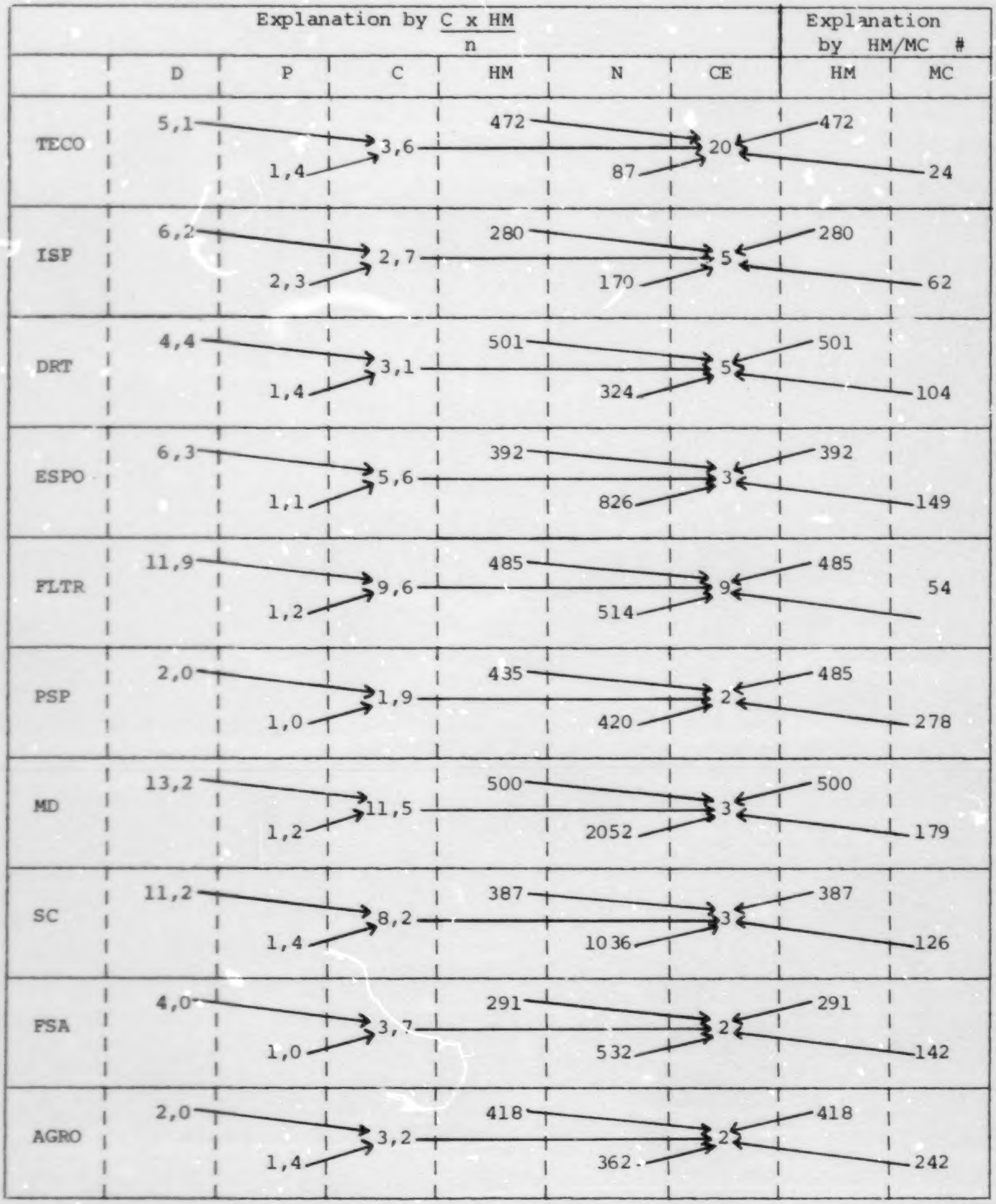
b) $CE = \frac{HM}{MC}$

The cost per student (in terms of hours ascribed)

- is directly proportional to the average student hour load
- is inversely proportional to the average number of students per course.

FIGURE 1

ANALYSIS OF FACTORS WHICH EXPLAIN THE "COSTS" (LECTURE HOURS ASCRIBED PER STUDENT IN THE FIRST LEVELS IN THE DIFFERENT SCHOOLS



	Explanation by $\frac{C \times HM}{n}$					Explanation by HM/MC #	
	D	P	C	HM	N	CE	HM	MC
TECO	5,1	1,4	3,6	472	87	20	472	24
ISP	6,2	2,3	2,7	280	170	5	280	62
DRT	4,4	1,4	3,1	501	324	5	501	104
ESPO	6,3	1,1	5,6	392	826	3	392	149
FLTR	11,9	1,2	9,6	485	514	9	485	54
PSP	2,0	1,0	1,9	435	420	2	485	278
MD	13,2	1,2	11,5	500	2052	3	500	179
SC	11,2	1,4	8,2	387	1036	3	387	126
FSA	4,0	1,0	3,7	291	532	2	291	142
AGRO	2,0	1,4	3,2	418	362	2	418	242

All in all,

$$\begin{tikzcd}
\text{HM} \arrow[dr] & \\
& \text{explain CE} \\
\text{MC} \arrow[ur] &
\end{tikzcd}$$

Limiting ourselves to lectures, we shall use these two formulae with a view to making a comparative analysis of the first cycles in the different faculties.

As one can see in the table below, the faculties can be characterized as follows where lectures in the first two years ("candidature") are concerned.

1. The most expensive per student is the Faculté des Sciences Théologiques et Canoniques (TECO), with 20 hours ascribed per student. This high cost is explained by the low number of students (87) and the high hour load (472).

2. The Faculté de Philosophie et Lettres (FLTR) is also relatively expensive (9 hours ascribed per student). This is explained mainly by the high hour load of the students (485), the low rate of sharing (1,2); and the high rate of diversity (11,9).

   But the number of students (514), without being very high, somewhat compensates for these factors.

3. The Faculté de Droit (DRT) and the Institut Supérieur de Philosophie (ISP) are relatively cheap (5 hours ascribed per student).

   - In the Faculté de Droit, this is due to a relatively low rate of diversity (4,4), considering the number of students (324), while the students' load is high (501).

   - In the Institut Supérieur de Philosophie, this is due above all to the low hour load of the students (280), and to a high rate of sharing (2,3), for a small number of students (170).

4. The other schools have rather low unit costs.

   - In the facultés de Medecine (MD) and Sciences (SC) (3 hours ascribed per student) this is due mainly to the high number of students (2 052 and 1 036). But the student's hour load is far higher in Medecine (500) than in Sciences (387). The latter, moreover, is characterized by a rather high rate of sharing (1,4).

     The rates of diversity in the both faculties are among the highest (13,2 and 11,2).

   - The facultés des Sciences Economiques, Sociales et Politiques (ESPO) and Sciences Appliquées (FSA) (3 and 2 hours ascribed per student) have rather average numbers of students (826 and 532). The student's hour load is rather average (392 and 291), and the rate of sharing is low (1,1 and 1,0), as is the rate of diversity (6,3 and 4,0).

- The facultés des Sciences Agronomiques (AGRO) and Psychologie et Sciences de l'Education (PSP) (2 hours ascribed per student) have a few students (362 and 420), but very monolithic programmes (rate of diversity = 2). Here, the students have fairly high hour loads (418 and 485), but the rate of sharing is far higher in Agronomy (1,4 as against 1,0).

APPENDIX

TECO: Faculté des Sciences Théologiques et Canoniques =
School of Theological and Canonic Sciences.

ISP : Institut Supérieur de Philosophie =
Higher Institute of Philosophy.

DRT : Faculté de Droit =
School of Law

ESPO: Faculté des Sciences Economiques, Sociales et Politiques =
School of Economic, Social and Political Sciences

FLTR: Faculté de Philosophie et Lettres =
School of Philosophy and Letters.

PSP : Faculté de Psychologie et des Sciences de l'Education =
School of Psychology and Education.

MD : Faculté de Médecine =
School of Medecine.

SC : Faculté des Sciences =
School of Sciences.

FSA : Faculté des Sciences Appliquées =
School of Applied Sciences.

AGRO: Faculté des Sciences Agronomiques =
School of Agronomic Sciences.

A MODEL FOR PLANNING SYSTEMATIC REPLACEMENT OF SCIENTIFIC EQUIPMENT

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ABSTRACT

Replacement of scientific equipment is becoming a major problem for institutions of higher education, especially those which grew quickly in the 1960's and 1970's. This paper presents a model system for budgeting for replacement of equipment based upon data which are already in existence at many universities. The pitfalls and problems associated with implementing the model are discussed, along with suggestions for future improvement.

INTRODUCTION AND PERSPECTIVES

The leveling of enrollments and limiting of funds for higher education has been a common, worldwide problem in recent years, although there have been national variations and institutional differences within nations and regions. One of the many effects of this trend has been the deterioration and obsolescence of equipment, purchased during the earlier growth years but now requiring considerable maintenance and systematic replacement. Much of the current scientific equipment inventory at American universities has been funded from two sources: one-time capital equipment funds used to furnish new classrooms and laboratories as they are built, and equipment allowances included in Federal grants and contracts. The drastic reduction in construction, coupled with a drastic reduction in Federal funds for the purchase of scientific equipment by college and university researchers, has shifted the responsibility for the purchase, maintenance, and replacement of laboratory equipment back to the institutions of higher education at a time when they are least likely to have funds available for such purposes.

Partially because of the way scientific equipment has been purchased in the past in the United States, few institutions and funding agencies, such as state coordinating boards, have developed objective planning and budgeting processes aimed at maintaining and replacing worn-out and obsolete scientific equipment. A common procedure at the college/university level is to make the equipment budget fit whatever is left over after other budgetary priorities are met. Salaries, utilities, etc. are budgeted for a particular year, for example, and only then is there some consideration of whether there are sufficient funds remaining to cover the purchase of scientific equipment. Of course several years of stringent operating budgets with few funds set aside for equipment purchases soon have a negative effect upon instructional and research programs due to the physical deterioration of the tools used for instruction and research.

In some situations state governmental agencies determine how much is to be budgeted for salaries, equipment, etc. of specific institutions. Even when these organizations resist the temptation to put almost all discretionary funds into salaries, however, the question remains, just as it does at the institutional level, as to how much is needed each year to replace the scientific equipment at a particular college or university. A similar issue arises when a funding agency, following past precedents, requests equipment funds from the state legislature in the same way that capital (construction) funds are solicited, i.e. on a one-time basis. Here again the question arises as to how much is needed by the institutions for this purpose.

PURPOSE

The purpose of the paper is to present a generalizable model for planning and budgeting for the replacement of scientific equipment within an individual university or university system. Although the methods and data described were developed at two universities in the United States, the model is aimed at addressing a worldwide problem and should be adaptable enough to meet the unique requirements of other universities' national/state/provincial systems.

LITERATURE REVIEW

Very little information concerning equipment replacement has found its way into the higher education literature, either because little has been done in this area or because those working in the field have not published their results. Even the business literature contains a paucity of information concerning this topic. Some of the sub-issues, such as planning in an inflationary environment (Navin and Magura, 1977) and planning for depreciation (Coughlan and Strand, 1969), have been treated in the literature, but with varying degrees of applicability to the problem of aging scientific equipment.

The literature of planning in an inflationary environment is useful in that it points out the need to take inflation into account in all planning activities. A piece of equipment purchased in 1975 will not normally be replaced for the same amount of money in 1985, so obviously some allowance for inflationary factors must be an integral part of any scheme for replacing equipment. The depreciation literature is relevant in that it points out the fact that all equipment has a useful life, but it is quite limited in that much of it is directed, at least in the United States, towards useful life for tax purposes rather than actual useful life. Being permitted to depreciate a piece of equipment over five years instead of ten for tax purposes is of limited interest to institutions of higher education, for they do not have profits to tax and are more concerned with the length of time that an item can be used.

One other issue that gets less attention in the literature than it deserves is equipment obsolescence. Changes in technology can make a piece of scientific equipment archaic and irrelevant while it is still functional; electronic calculators have replaced slide rules even when the latter are in good working conditions, for example. Industry managers and accountants are among those who have organized this as a problem.

> The primary criticism one hears in conversation with managers relating to the use of replacement cost is that technical changes make the estimation of replacement cost irrelevant. If replacement is not to be in kind, of what use is the estimate of replacement cost of assets currently in use? (Bierman and Dukes, 1979)

Ideally replacement should be with "state-of-the-art" equipment, not "in kind," but this makes budgeting for replacement all the more difficult.

METHODOLOGY AND DATA SOURCES

The methodology used in describing the model is similar to that developed by Matt (1976). Briefly, one utilizes an existing record of equipment containing date of purchase, original cost, and expected useful life for each item in the inventory of scientific equipment. From use of the existing data, one can estimate what replacement needs will be in a single year. Key factors in the estimation process include: the original value of those items which are due, on paper, for replacement in the current year; and inflation factors used to estimate overall replacement costs in the current year. While this method does not address problems such as inadequacy of inflation factors, the costs associated with new additional equipment rather than just replacement of existing equipment, and obsolescence brought about by technological change, it does provide an institutionwide procedure for estimating equipment replacement needs for a single year. Specific equipment requests, such as those of individual departments, can be examined in the context of overall institutional needs.

Data for demonstration of the use of the model come from basically two sources: inflation statistics reported by the United States Government (Bureau of Labor Statistics, monthly) and the existing inventory of scientific equipment of a single, state-supported, urban university in the American Midwest. The latter set of records has been maintained for years in order to keep track of university property, which is in fact also state property. The state requires this file to be maintained for accounting and property control purposes, but it has not been used in the past for planning at either the state or university level. Although the file contains data on all university-owned equipment worth over $50 at purchase, the data here are limited to the category of the file containing only scientific equipment.

RESULTS

The first step in obtaining an estimate of equipment needs in a single year is the computation of value of the items which are due for replacement in that year. In the case described here, the state guidelines are for an expected lifetime of ten years for scientific equipment, so that one can assume that at a minimim the equipment purchased in 1971, for instance, should be replaced in 1981. In light of quick obsolescence due to constant use and technology changes, the assumption of a ten-year lifetime appears to be a conservative one. The number and total purchase value of the inventory for the years 1971-81 are given in Table 1.

As Table 1 demonstrates, scientific inventory values have varied greatly as to year of purchase. The 1980's were a period of growth for the university in numbers of students, faculty, and facilities, including laboratories, so investment in equipment grew with the university. The data in 1980 and 1981 reflect a leveling of enrollment and construction, with a subsequent decrease in expenditures for scientific equipment. The actual dollar values themselves suggest that major replacements will be needed in the 1980's using the conservative, ten-year lifespan for scientific equipment recommended by the state. When inflationary considerations are studied, the situation is far worse than it first appears.

A problem encountered in examining inflationary effects regarding scientific equipment is that there are no specific inflationary indexes for scientific equipment. The Monthly Labor Review publishes data on many industries, as well as the better-known Consumer Price Index, but no specific category is given over to the scientific/laboratory equipment. Probably the closest index is that labeled, "Machinery and Equipment, except Electrical," which is part of the Producer Price Index series for special commodities groupings. Calculations using both the Consumer Price Index and the more specialized Machinery Index are presented below.

TABLE 1

SUMMARY OF LABORATORY EQUIPMENT COSTS
BY YEAR AS OF SUMMER, 1982

Year of Acquisition	Number of Items	Total Original Value
1971	133	$ 62,937
1972	277	108,308
1973	865	357,230
1974	220	136,665
1975	377	235,102
1976	332	266,084
1977	226	106,898
1978	228	156,484
1979	195	179,027
1980	114	103,679
1981	119	81,155

Through the use of an inflationary index, one can convert 1971 dollars, for example, into 1981 dollars in order to estimate replacement costs for equipment purchased in 1971. The annual Consumer Price Index for 1971 was 121.3, based on 1967=100.0. In other words, goods and services purchased for $1.00 in 1967 cost $1.213 in 1971. The same index for 1981 was 272.3 or 2.723 times as much as in 1967. Using these data, one could estimate that equipment purchased in 1971 would cost 272.3/121.3 or 2.245 times as much in 1981. The estimated replacement cost for 1981 would then be 2.245 times the original cost in 1971. The result of converting original costs into 1981 dollars is shown in Table 2. In order to smooth out the ups and downs of original purchases for budgeting purposes, Table 2 also includes three-year and five-year moving averages based upon the 1981 dollar equipment inventory values.

As Table 2 demonstrates, the effects of inflation on equipment replacement are substantial. Instead of the original $62,937 spent in 1971, scientific equipment replacement for 1981 should be budgeted at a minimum of $141,284 just to stay even, absent of technological change effects. If one wishes to smooth out the effects of varying purchase rates in past years, the replacement budget should be between $200,000 and $300,000 just to replace worn-out scientific equipment purchased in 1971. Note that the amount spent for this purpose in 1981 was just over $81,000.

TABLE 2

SUMMARY OF UNIVERSITY LABORATORY EQUIPMENT COSTS BY YEAR IN 1981 DOLLARS (CONSUMER PRICE INDEX) AS OF SUMMER, 1981

Year of Acquisition	Total Original Value	Consumer Price Index	1981 Dollars	Three-Year Moving Ave	Five-Year Moving Ave
1971	$ 62,937	121.3	$141,284	$201,742	$291,263
1972	108,308	125.3	235,373	369,163	317,603
1973	357,230	133.1	730,832	406,054	351,316
1974	136,665	147.7	251,956	459,975	408,050
1975	235,102	161.2	397,136	358,015	393,051
1976	266,084	170.5	424,954	327,489	290,520
1977	106,898	181.5	160,376	267,837	284,915
1978	156,484	195.3	218,180	200,828	226,353
1979	179,027	217.7	223,928	182,145	157,593
1980	103,679	247.0	104,326	136,470	
1981	81,155	272.3	81,155		

Use of the more specialized Machinery and Equipment, except Electrical Index shows that, if anything, the Consumer Price Index **underestimates** scientific equipment needs in 1981. Table 3 summarizes the results of employing the more specialized index.

During the 1981-82 academic year, university staff attempted to gather some data internally to determine if even the more specialized index understimates scientific equipment replacement needs. Department chairmen, as part of an application process for equipment replacement funds, were asked to identify which items would be replaced by new items purchased. By locating the original cost and year of acquisition of the pieces of equipment, it was possible to get a very rough idea as to how much the items had inflated in cost. The estimates were indeed very rough in that some items were probably being replaced by better, state-of-the-art ones which would be generally more costly. There were also only a few pieces of equipment involved, so the data have to be considered with great reservations. As Table 4 demonstrates, however, the internally-generated price indexes were higher than the standard ones in ten out of twelve years, again suggesting that the standard indexes are conservative at best. The fact that items were being considered for replacement prior to the tenth year after purchase also suggests that the estimate of replacement costs were quite conservative.

TABLE 3

SUMMARY OF UNIVERSITY LABORATORY EQUIPMENT COSTS BY YEAR IN 1981 DOLLARS (MACHINERY INDEX) AS OF SUMMER, 1981

Year of Acquisition	Total Original Value	Machinery Index	1981 Dollars	Three-Year Moving Ave	Five-Year Moving Ave
1971	$ 62,937	118.9	$152,605	$218,266	$319,029
1972	108,308	122.2	255,525	406,144	346,408
1973	357,230	127.1	810,302	444,256	375,297
1974	136,665	147.6	266,941	489,452	427,708
1975	235,102	173.3	391,113	357,571	407,780
1976	266,084	185.0	414,660	320,553	287,824
1977	106,898	197.7	155,886	260,355	278,512
1978	156,484	214.3	210,520	195,596	223,124
1979	179,027	234.2	220,382	181,692	156,423
1980	103,679	261.8	114,174	138,570	
1981	81,155	288.3	81,155		

TABLE 4

SUMMARY OF REPLACEMENT COSTS IN 1981 DOLLARS OF UNIVERSITY LABORATORY EQUIPMENT ACCORDING TO DEPARTMENT CHAIRMEN AS OF SPRING, 1982

Year of Acquisition	Original Cost	Estimated Current Cost	Current Cost/ Original Cost	Consumer Price Index/ 1981 C.P.I.	Machinery Price Index/ 1981 M.P.I.
1970	$1,429	$ 3,118	2.182	2.341	2.527
1971	894	7 520	8.412	2.245	2.425
1972	9,930	26,688	2.688	2.173	2.349
1973	9,875	50,740	5.138	2.044	2.268
1974	8,012	15,734	1.964	1.844	1.953
1975	1,854	4,171	2.250	1.689	1.664
1976	1,515	2,573	1.698	1.597	1.558
1977	253	1,690	6.680	1.500	1.458
1978	492	695	1.413	1.394	1.345
1979	3,195	12,495	3.911	1.251	1.231
1980	4,294	4,682	1.090	1.102	1.101
1981	1,479	1,700	1.149	1.000	1.000

The model as presented here demonstrates how an existing file can be used for planning purposes. Examining the available data from one university, it appears that the question becomes not if replacement of scientific equipment has been inadequate recently, but by how much. Some of the assumptions used in the above calculations, such as the ten-year life span, are arguable. Certainly laboratory benches and some other items often are used beyond ten years. On the other hand, however, many items are also used less than ten years due to technological obsolescence or simple heavy use. If an argument had to be made one way or the other concerning the assumptions, it appears that they are probably too conservative; the university is probably underfunding scientific equipment replacement even more than these data suggest.

As seems to be common with studies of the type described here, some of the most interesting aspects came out of the planning process itself. It was found, for instance, that some items still in the file were no longer usable; the departments had no incentive to remove them. This suggests that, if the file is to be used for planning purposes in the future, incentives should be given to departments to remove nonfunctional equipment from it. In some academic fields, such as the biological sciences, locked laboratories prevent even department chairmen from determining if certain items are in use or not. Obviously close faculty cooperation will be needed in order to get a more accurate record of current scientific equipment.

The problem of technological obsolescence has been mentioned previously. A related issue is the rate of change of technology in certain disciplines and sub-disciplines. In the College of Engineering, for example, it was found that some departments were comfortable with the ten-year lifespan for equipment, while others were in such rapidly changing fields that three to five-year lifespans would be too long to keep up with technological changes. It is impressive that disciplines that seem to be closely related, at least to the casual observer, have widely different needs concerning technological obsolescence.

Another interesting discovery is that faculty turnover can have a strong effect on equipment needs. Commonly a faculty member is hired with an agreed-upon research agenda which requires different scientific equipment from that already available. If that same faculty member leaves the university, it is not uncommon for the scientific equipment to be totally useless to others not working in the same specialty area of research. The equipment may be functional, but without faculty interested in using it, it is useless to the institution.

Several other points came up during the study concerning the maintenance of the equipment file. Creative faculty and technicians have been able, in certain fields, to upgrade items by changing existing ones, but the changes are seldom reflected in the inventory. In addition, some items such as expensive light bulbs are now being included in the inventory due to the $50 rule, i.e. all items costing over $50 are considered equipment by the state regardless of their true expected lifetime. Such idiosyncrasies as these can probably be found in most files of this type, so care must be taken in the data collection and analysis stages of planning efforts concerning scientific equipment.

CONCLUSION

A method for determining scientific equipment needs has been outlined above. The basic tools are published inflation factors and existing equipment inventories.

A few common problems and pitfalls are discussed as well. The message of the study is clear: unless we in higher education quickly begin to plan for and fund the replacement of scientific equipment, our institutions will soon be unable to adequately perform their roles of teaching, research, and public service.

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THE LINK BETWEEN THE UNIVERSITIES WITH PERMANENT RESEARCH FACILITIES AND THE UNIVERSITY COLLEGES WITHOUT RESEARCH FACILITIES

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THE AUGMENTED MISSION OF SWEDISH HIGHER EDUCATION IN THE CAUSE OF SOCIAL DEVELOPMENT.

The development of our society and the process of adjusting to constantly changing living conditions presuppose knowledge, competence and developmental approaches. The importance of research has been stressed in this connection. As a foundation for coming efforts, the Swedish Government has given priority to research fields which are taken to have a particularly important bearing on national development. In the analyses which have formed part of the long-range assessments made concerning the Swedish economy, the introduction of new techniques, improved and wider access to education and developmental resources and the more efficient organization of production have been highlighted as particularly important prerequisites of future development. In assessments of developments during the 1990s, crucial importance is attributed to these factors. Accordingly, it has been judged essential for knowledge concerning new technology and research findings to reach groups whose activities are vitally affected by this knowledge.

The decentralized system of higher education resulting from the policy decision made by the Riksdag (i.e. the Swedish Parliament) in 1975 and which was put into operation in 1977, has done a great deal to strengthen regional and occupational links with higher education, research and development. The competence which the higher education units represent in the various regions is judged to be an essential resource for regional development and for adjustment to changing conditions. Opportunities for higher education units to take part in regional development work have been successively strengthened in various respects.

Given these broader opportunities, it is important that higher education units should devise efficient working methods whereby they can contribute towards and take part in the development of the region and the local community. One vital task for each individual unit is itself to initiate and develop co-operation with the local community in these matters. The present memorandum, based on experience of work at the Sundsvall/Härnösand higher education establishment - which is one of the establishments recently inaugurated as part of the 1977 reform of higher education and which lacks permanent research resources - will illustrate how this establishment has tried to identify conceivable ways of participating in the development work of its county, and also how it has tried in this connection to strengthen its links with higher education establishments having permanent research resources and with the local community, in order to initiate research projects of importance to the county and in order to devise means of disseminating research information. The Sundsvall/Härnösand establishment has been anxious to develop a model for a link function, for purposes of research co-operation and research information, with higher education units having permanent research resources. The success of such a link function is conditional on the establishment improving its planning, above all as regards personnel mobility, research information, co-operation with R & D institutes and centres of importance to the county, and long-range planning.

A SHORT DESCRIPTION OF THE ORGANIZATION OF HIGHER EDUCATION IN SWEDEN

As a result of the 1977 reform of higher education, 33 higher education units were set up in 25 places throughout Sweden under the authority of the Ministry of Education and Cultural Affairs. In addition there is the Agricultural University of Sweden, which comes under the Ministry of Agriculture. Two more higher education units are to be established within the next few years, in Skövde and Halmstad. The Government and Riksdag do not at present entertain any plans for the establishment of further national higher education units.

The higher education units coming under the authority of the Ministry of Education are included in one or other of the six higher education organizations whose task is to co-ordinate higher education and to lay down guidelines for the renewal of basic higher education. The task of the regional boards is to help link up educational programmes without permanent research resources with ongoing research.

Ten of the existing higher education units have permanent research resources. Units lacking such resources are expected to maintain close contacts with research by means of the research link arrangement. The policy decisions adopted by the Riksdag do not provide for the establishment of permanent research resources at a larger number of higher education units.

FEASIBILITY OF A LINK FUNCTION BETWEEN THE SUNDSVALL/HÄRNÖSAND HIGHER EDUCATION ESTABLISHMENT AND HIGHER EDUCATION ESTABLISHMENTS HAVING PERMANENT RESEARCH RESOURCES.

The Sundsvall/Härnösand higher education establishment is one of the higher education and research units lacking permanent research resources and constitutes one of the four national higher education units in the Umeå Higher Education Region. Umeå University and the Luleå Institute of Technology are the units within this region having permanent research resources. Umeå University has permanent resources for technical research. The other two units in the region - the Sandsvall/Härnösand and Östersund higher education establishments - have no permanent research resources. The policy decisions already made by the Government and Riksdag concerning future developments in higher education and research imply that no permanent research resources will be allotted to the new higher education establishments. The task of these establishments is to take charge of education, research links and research information. The permanent resources allocated to higher education for the conduct of education also provide opportunities and facilities for the discharge of their other two tasks.

Educational resources

The expansion of higher education must be undertaken with due regard for the possibilities of also meeting requirements concerning research links and research information.

The activities of the Sundsvall/Härnösand higher education establishment have been gradually transformed since the introduction of the higher education reform in 1977. Studies now comprise 15 programmes. These are attached to technical vocational education, administrative, economic and social vocational education, and the sector for teaching professions.

The number of student equivalents for 1982 is about 1 500, and the student population is estimated at some 1 700. Relatively important changes will be introduced in the 1982-83 academic year and are expected to raise the number of student equivalents to about 2 000 in a few years' time.

Research links and research information are made possible by careful planning of basic education resources. The personnel are the establishment's main asset for the development of these activities. The Sundsvall/Härnösand establishment has about 140 appointments, 106 of them teaching appointments. More than 50 per cent of the teaching staff are senior lecturers, while just under half are junior lecturers.

	Senior lecturers	Junior lecturers	Total
Technology/natural sciences	16	25	41
Social sciences/information	21	3	24
Teaching professions	20	21	41
	57	49	106

The ongoing expansion of educational activities is expected to bring a further improvement of qualifications and an increasing number of senior and junior lectureships. This expansion will probably come in the technology/natural science and social science/information sectors. The establishment can provide training in research methods for teachers who lack research qualifications.

The scope and direction of studies also determine the structure of other basic resources. Facilities and equipment are obtained with reference to the focus of studies.

The establishment is expected to acquire additional premises during the coming period. As a result, all teachers will acquire individual work points, which will facilitate development work and research. New equipment will present opportunities of conducting more advanced experimentation. Facilities and equipment, and personnel with research qualifications, are the basic resources to be employed by the establishment in building up a link function with higher education units having permanent research resources.

Exchanges between the Sundsvall/Härnösand establishment and higher education units having permanent research resources.

Higher education has to be scientifically based. Through its research link, the higher education establishment maintains continuous contact with research. At present this link occupies only a very small proportion of the establishment's total activities. Proximity to research is achieved mainly through established contacts with the units in the Umeå Higher Education Region, i.e. Umeå University and the Luleå higher education establishment. There are contacts with other units in Sweden, and also an incipient exchange at Nordic and international levels in matters concerning research links.

The following are some of the activities at the establishment which are dependent on close contact with higher education units having permanent research resources.

Regional faculty assemblies:	The regional faculty assemblies give higher education staff with research qualifications an opportunity of taking part in research consultations together with Umeå University and the Luleå Institute of Technology.
Sabbatical leave for research:	Subject to assessment by and consent from the Regional Board, teaching staff of the higher education establishment engaged in postgraduate studies can be given sabbatical leave to conduct their own research. The establishment is allotted special moneys for this purpose.
Contact researchers:	Establishment staff with research qualifications can work on research projects for a limited period as contact researchers with companies or public authorities. Grants are also obtainable from national-county authorities for these purposes.

Special research projects and the engagement of research students in teaching and other capacities provide the establishment with opportunities of further strengthening its links with higher education units having permanent research resources.

Contacts between the Sundsvall/Härnösand establishment and the local community as a starting point for the construction of a link function with higher education establishments having permanent research resources.

Efforts by the higher education establishment to disseminate information on research and research findings and to promote closer contacts between its local community and higher education units with permanent research resources can refer to a variety of fields. The starting point may be society's need for additional knowledge and research in matters relating, for example, to children and young persons, technology and computers, energy and alternative forms of energy, the occupational environment and social issues, finance and marketing, transport and forwarding operations. All these fields are considered vital to the development of enterprise. In developing its contacts with the local community, the higher education establishment has begun by concentrating on particular recipient groups, with reference to which it has endeavoured to gauge the possibilities of promoting and contributing towards closer contact in vital research questions. This has led to the following assessments by the Sundsvall/Härnösand establishment.

Large companies:	The large companies in the county are usually in close touch with research, and the competence of the higher education establishment is of minor importance in this context. The companies themselves have the national and international research contacts they are interested in.
Public activities:	Public activities bulk large in the county. There is growing interest in research and an ongoing build-up of internal research capacity. Here the higher education establishment has an opportunity of taking part in research and research information measures of various kinds. This participation, however, should be preceded by a closer exploration of needs and interests.

Small and medium sized companies:	Measures of various kinds are being planned in the county to strengthen the development potential of small businesses. The higher education establishment's contact research activities are one example of inputs in this quarter. It is felt that the higher education establishment urgently needs an innovation secretaryship to organize closer contacts between small and medium sized firms and research activities at the higher education units with permanent research resources, particularly within the Umeå Higher Education Region.
Company research:	Inputs of various kinds are being discussed at the higher education establishment regarding contacts with the research activities of major companies in the county. Seminars and symposia have been arranged by the higher education establishment with reference to this group.

Research and development institutes in the county

Starting some years ago, R & D institutes have been set up in the county in which the higher education establishment is situated, with a view to encouraging the development of specific sectors and fields of particular importance to the county. Co-operation is being developed between the higher education establishment and these institutes as regards personnel equipment and facilities. Together with the higher education establishment, these institutes are a strategic element of the county's development prospects.

The Institute of Plastic and Rubber Technology

The Institute of Plastic and Rubber Technology was opened in Sundsvall in 1980 for strength testing. This Institute, which has advanced technical equipment, receives commissions from industry, provides counselling and educational services and is taking part, together with several universities and colleges, in a research programme concerning polymer-based fibre composites.

The Institute and the higher education establishment share services and certain advanced equipment.

The Aluminium Institute

An Aluminium Institute was set up in the county in 1981 by national-county authorities and enterprise to facilitate new industrial ventures and industrial development in the aluminium sector in the county. Sundsvall has Sweden's only aluminium smelting plant.

Systems Analysis Institute

A Systems Analysis Institute was established in 1981 with the aim of promoting development in the electronics sector within small and medium sized firms in the county.

The Institute is continuously in touch with upwards of 25 companies in the field of systems analysis. The higher education establishment is called upon to provide educational, developmental and information services for these companies. The establishment's staff, equipment and facilities are employed in these activities. The Institute in turn lends the establishment advanced equipment for its own activities.

MODEL FOR A LINK FUNCTION BETWEEN HIGHER EDUCATION ESTABLISHMENTS RESPECTIVELY LACKING AND POSSESSING PERMANENT RESEARCH RESOURCES.

The construction of a model and strategy for a link function with higher education establishments having permanent research resources is necessary in order to widen the educational and research activities of higher education establishments without such resources. Education is the dominant activity at establishments of the latter kind. They do engage in research, but they lack the resources for achieving research on any considerable scale. The role which higher education establishments without permanent research resources wish to assume in meeting essential research requirements and providing research contacts for the surrounding community must be based on close co-operation and wider collaboration with higher education establishments equipped with permanent research resources. A model for a link function should be a natural part of and complement to education and research at these units. In principle, the organization of total activities on the basis of such a model can entail the following: (Page 127)

- The research inputs and research information needed and desired by the county.

Higher education establishments with no permanent research resources should make it their business to investigate county requirements concerning research inputs and research information. This can be done via the contacts which Swedish higher education establishments without permanent research resources have with the vocational representatives included in their policy-making bodies. These assessments can be based on special surveys and projects undertaken together with representatives of county activities. The policy decisions made by the Riksdag and Government concerning efforts in special research fields to develop various sectors of society can provide another point of departure from which to identify the research inputs and research information needed in the county.

- Needs and preferences of various target groups in the county concerning research inputs and research information.

The need for research inputs and research information should be narrowed down with reference to various target groups and recipients in the county. R & D qualifications and the long-term aim in research questions affecting these target groups should be defined more closely. Target group determinations can, for example, include large companies, small and medium sized companies, public activities, etc., or policy makers, children, journalists, etc. Target group determination of this kind can also be effected on the basis of priorities defined by the Riksdag and Government with regard to research inputs and research information. The higher education establishment should also find out whether these recipient groups have research resources and programmes of their own.

- Definition of internal competence within the various vocational education sectors at higher education establishments without permanent research resources, as regards participation in our responsibility for contacts with a view to research inputs and research information.

Higher education establishments without permanent research resources should assess their qualifications and potential for participation in research inputs and research information on the basis of the priorities defined by Government and Riksdag concerning these activities. Higher education establishments without permanent research resources may have the qualifications and financial capacity to conduct by themselves research corresponding to the needs of various target groups in the county, they may be qualified to participate in research projects mounted by higher education units with permanent research resources and of importance to various target groups in the county, and they can consider the possibility of organizing such inputs as symposia, seminars and information measures through various forms of co-operation with higher education units with permanent research resources. The contact between higher education units in the higher education region having permanent research resources provides a natural foundation for this co-operation. Knowledge concerning R & D qualifications at higher education units with permanent research resources is one's own higher education region, but also at other units in the country and, to some extent, internationally is an important factor in the build-up of competence at higher education units without permanent research resources.

- Implementing organization

Higher education units without permanent research resources should set up an organization within each unit to take charge of research and research information contacts with various target groups in the county and with units having permanent research resources. The task of such a department should be to draw up long-term programmes for inputs, to estimate the personnel required for effecting the inputs - which may mean borrowing personnel and researchers from other units - and to estimate the facilities and equipment required for effecting the inputs. Another task for a department of this kind is to keep in touch with other R & D institutes in the county.

THE FUTURE FEASIBILITY OF EXPANDING THE LINK FUNCTION AT HIGHER EDUCATION UNITS WITHOUT PERMANENT RESEARCH RESOURCES.

In the wake of a stagnant economy, emphasis is being placed on the importance of R & D concerning new activities. Despite spending cuts elsewhere in the State sector, research at Swedish universities and colleges has been one of the few instances where public spending has increased in some respects. This applies particularly to technical research. A succession of reforms has made it possible for higher education units to deploy their existing resources more rationally, but other incentives have also been decided on which have an indirect bearing on the prospects of universities and colleges conducting R & D work, and which in turn have helped to strengthen links with the surrounding community. Incentives for the establishment of small businesses are a case in point. Support for regional development is another example. The Riksdag has debated several Government Bills concerned in various ways with the ability of higher education establishments to take part in more societally oriented R & D work and which in turn are conducive to closer co-operation between higher education units respectively lacking and possessing permanent research resources.

EXAMPLES OF EXCHANGES WITH SWEDISH HIGHER EDUCATION UNITS HAVING PERMANENT RESEARCH RESOURCES

Vocational education sector	Within the Umeå Higher Education region		Other higher education units in the country with permanent research resources	
	Umeå University	Luleå Institute of Technology	Uppsala University	Other higher education units
Technology/Natural science	The higher education establishment takes part in the regional faculty assembly. Continuous contacts with departments in research matters. Research students studying at Umea. Participation in lectures and symposia. Researchers and teachers engaged from Umeå University.	Takes part in the regional faculty assembly.	Several teachers participating in and monitoring certain energy and physics research. Researchers engaged for certain projects at the higher education establishment.	Contacts with other institutes of technology concerning systems analysis and chemistry.
Social science/ Information	Member of the faculty assembly. Participants in research seminars, symposia and research projects. Research students teaching in Umeå. Researchers engaged from Umeå University. Teachers on sabbatical leave for research contacts with researchers in Umeå. Contact researchers. Cooperation with researchers on a major research project.		Research students employed as teachers at the higher education establishment. Teachers participating in research projects at the university. Researchers engaged as lecturers.	Contacts with chemistry research at the Royal Institute of Technology, Stockholm, and systems analysis research at Lund University, the Cahlmers Institute of Technology and the Linköping Institute of Technology.
Teaching professions	Member of faculty assemblies. Researchers from Umeå participate continuously in research-linked projects.		Teachers from the higher education establishment following research projects at the university.	Participation in social science research projects at Stockholm University.

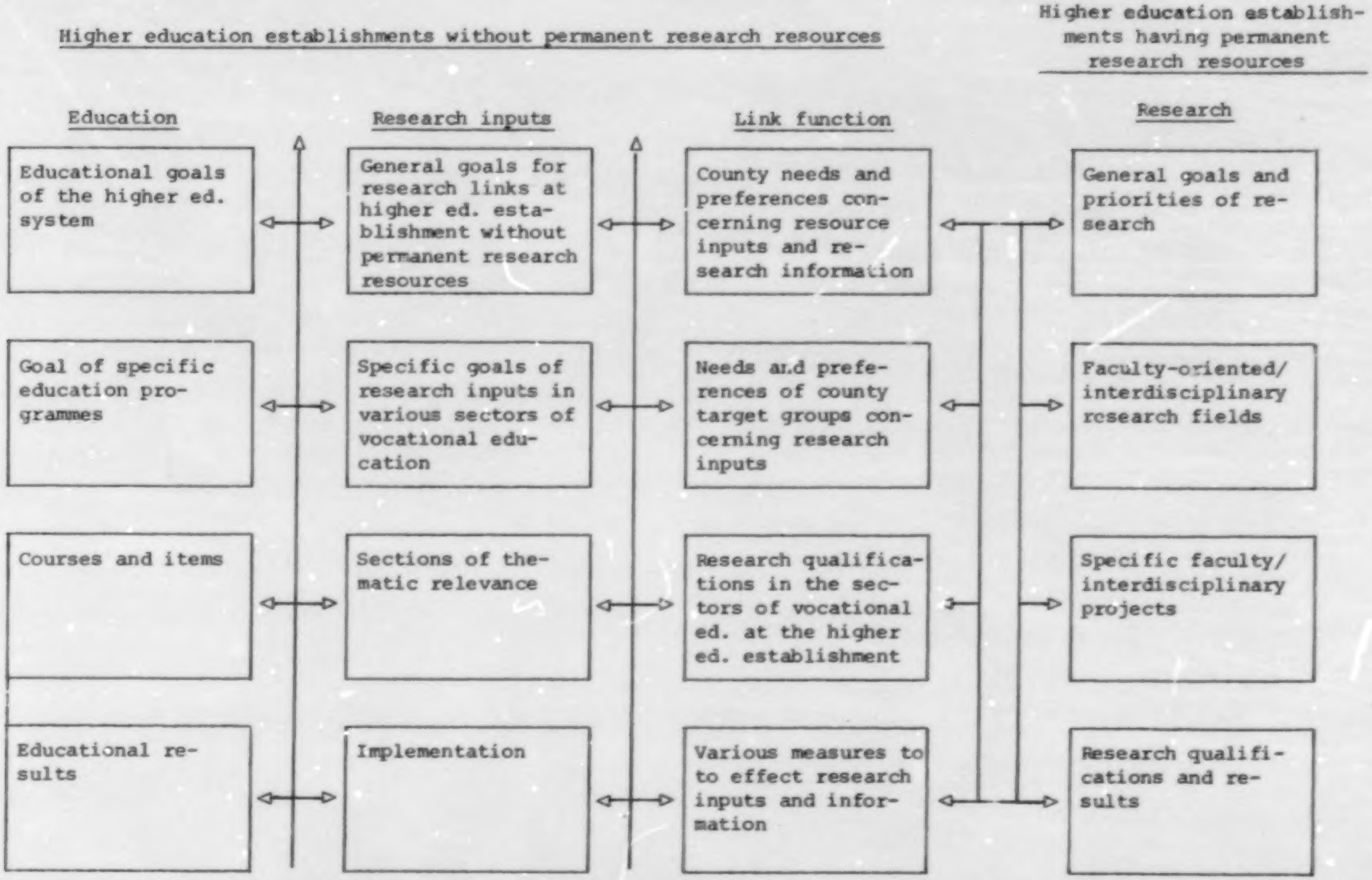
EXAMPLES OF EXCHANGES WITH HIGHER EDUCATION UNITS OUTSIDE SWEDEN HAVING PERMANENT RESEARCH RESOURCES

	Nordic countries	Other European countries	U.S.A.
Technology/Natural science	Contacts with the Norwegian Technical Institute and the Maritime College, Trondheim, concerning technology and shipping.		Development of programmes with the University of Southern Maine concerning research and teacher exchanges in higher vocational education.
Social science/Information	Exchange with Helsinki University concerning programmes for contact between universities and local authorities with a view to the development of rural enterprise. Exchange with Vasa College, Finland, in the same sector.	Participation in a European research project on the organization of large companies, etc. A study involving several European universities and colleges.	
Teaching professions	Exchanges with Swedish, Finnish and Norwegian higher education establishments concerning teacher education.		

EXAMPLES OF MEASURES TAKEN BY THE SUNDSVALL/HARNOSAND ESTABLISHMENT TO ENCOURAGE THE RESEARCH CONTACTS OF VARIOUS GROUPS IN THE COUNTRY

	Large companies	Small and medium sized companies	Public activities	Company research
Technology/Natural science	Symposium on research into control techniques. Researchers from the institutes of technology and Umeå University took part. Technical seminars. Information on research concerning the use of native fuels.	Development, work and support for newly established systems analysis firms. Development of CAD/CAM-centre.	Information to senior municipal officers on new data techniques. Several universities and colleges taking part.	Some research information via seminars.
Social science/ Information	Information on aspects of the occupational environment relating to shift work.	Marketing/Transport development. Programme for contact researchers and study of company development.	Social field station - a joint venture by the higher education establishment, Umeå University and the Municipality of Sundsvall. The Municipality of Sollefteå - a joint venture by the Municipality, the higher education establishment and the University of Helsinki.	
Teaching professions		Innovation secretary for closer links between small and medium sized firms in the county and research, particularly in the Umeå Higher Education region. Concerns all sectors of vocational education.	Information to certain school staff and day nursery staff in the county concerning current research.	

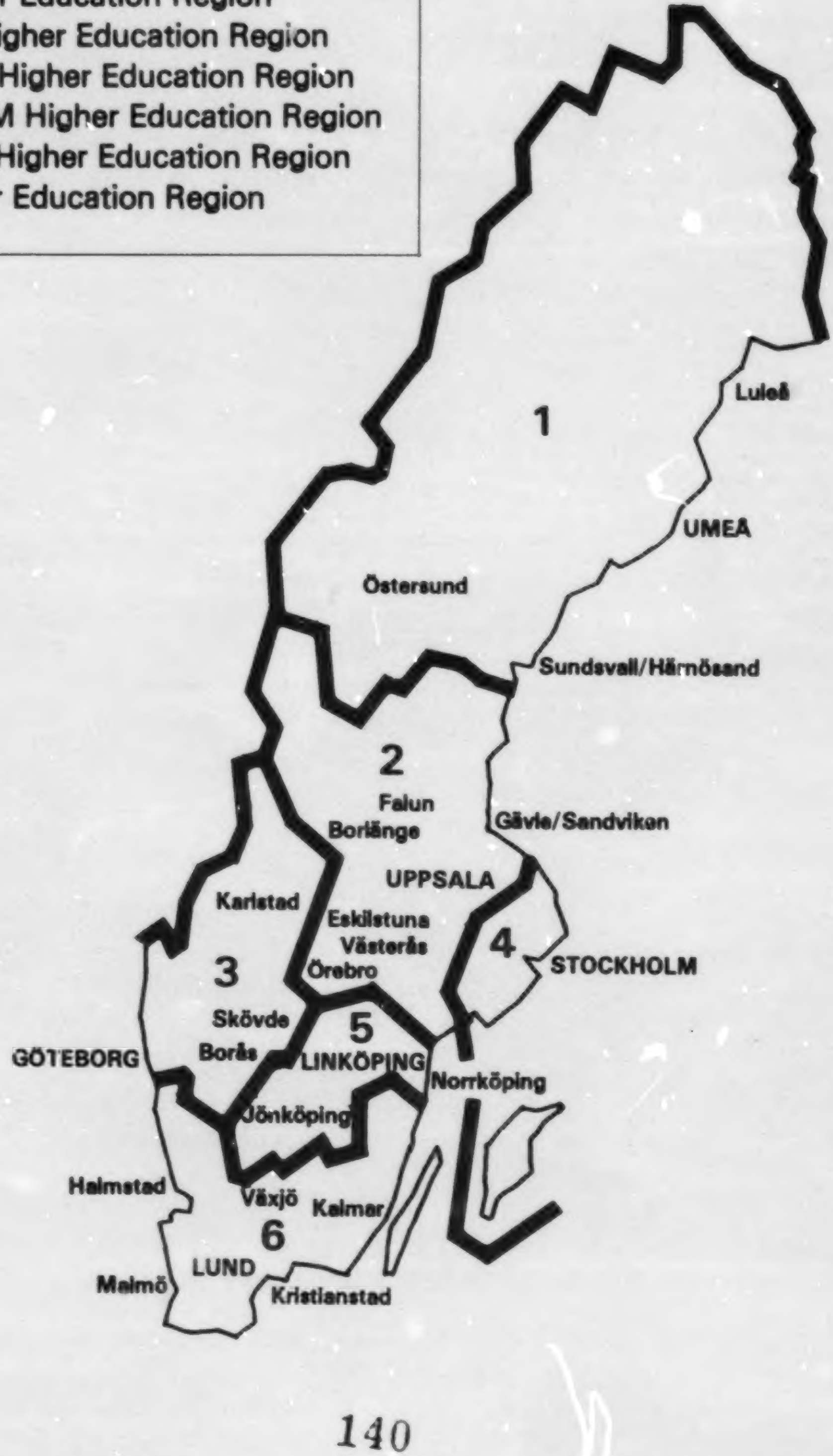
MODEL FOR RESEARCH INFORMATION IN RELATION TO RESEARCH: RESEARCH LINK AND EDUCATION



Higher education establishments without permanent research resources			Higher education establishments having permanent research resources
Education	Research inputs	Link function	Research
Educational goals of the higher ed. system	General goals for research links at higher ed. establishment without permanent research resources	County needs and preferences concerning resource inputs and research information	General goals and priorities of research
Goal of specific education programmes	Specific goals of research inputs in various sectors of vocational education	Needs and preferences of county target groups concerning research inputs	Faculty-oriented/ interdisciplinary research fields
Courses and items	Sections of thematic relevance	Research qualifications in the sectors of vocational ed. at the higher ed. establishment	Specific faculty/ interdisciplinary projects
Educational results	Implementation	Various measures to to effect research inputs and information	Research qualifications and results

THE GEOGRAPHICAL DISTRIBUTION OF HIGHER EDUCATION AMENITIES

1. UMEÅ Higher Education Region
2. UPPSALA Higher Education Region
3. GÖTEBORG Higher Education Region
4. STOCKHOLM Higher Education Region
5. LINKÖPING Higher Education Region
6. LUND Higher Education Region


Luleå
1
UMEÅ
Östersund
Sundsvall/Härnösand
2
Falun
Borlänge
Gävle/Sandviken
UPPSALA
Karlstad
Eskilstuna
Västerås
4
STOCKHOLM
3
Örebro
Skövde
5
GÖTEBORG
Borås
LINKÖPING
Norrköping
Jönköping
Halmstad
Växjö
Kalmar
6
LUND
Malmö
Kristianstad

A QUALITATIVE MODEL FOR INSTITUTIONAL SELF-STUDY

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Florida State University

INTRODUCTION

Whenever the higher education system of a nation permits students to transfer among institutions, a problem arises of comparing the educational quality at one institution with the educational quality at another institution. The general kind of question is, "Is the chemistry graduate from one institution as prepared as a chemistry graduate from another institution to undertake graduate work at a third institution?" A more specific question is, "Is a course in organic chemistry at one institution approximately the same as an organic chemistry course in another institution?" And who is to make the judgement about the qualitative equivalence of institutions within a system? Many arrangements are possible, including a national ministry, formal agreements among institutions, and voluntary regional associations. For the purpose of this paper, the voluntary regional accrediting associations have been selected because the self-study for these regional accreditation agencies is fundamental to institutional research. In the United States, most offices of institutional research were established as a direct result of the requirement by these accrediting agencies to have an institutional self-study conducted periodically (every 5 to 10 years) as a condition prior to formal accreditation. As illustrated by the figures at the end of this paper, the process of self-study is extensive in scope and involves an entire institution for a period of many months. The data collection effort has historically been so time consuming and so frustrating that, at the end of the study, those who have collected the data have been asked to continue to do so between studies in order to make the effort easier the next time. Typically, a formal office of institutional research is established and, during the years between self-studies, the office serves the institution as a place to refer inquiries which can be answered by institutional data. The office may, in time, take on additional responsibilities for planning, budgeting, evaluation, and policy studies, but a basic responsibility remains to collect data which will allow the institution to compare its performances with its purposes.

HISTORICAL BACKGROUND OF SELF-STUDIES

There have been three major types of assessment during the last nine centuries, since European universities began. First, teachers have assessed students; second, western society has assessed its higher education institutions. Teachers award certificates of competence, societies provide money and facilities, and students make their assessments, particularly in the last two centuries, by throwing rocks, boycotting classes, rioting and harassing their professors. "There were a variety of colorful rebellions - such as the bread and butter rebellion of 1805, the rotten cabbage rebellion of 1807, and the great conic sections rebellions at Yale 1830" (Harcleroad, 1981, p.4). Later in the 19th Century a more formal self-study process was begun in order to regulate the quality of educational institutions in much the same way the government regulates the integrity of the money it prints. Frank Dickey (1971) stated this as a principle like Greshman's Law, "As a society places greater value on the attainment of academic degrees, the degrees from colleges and universities whose academic programs are superficial and shoddy will undermine the value of similar degrees from institutions whose educational offerings are excellent." (p. 46)

Accreditation has taken on additional meaning in recent years. Though voluntary, it is a means of establishing eligibility for participation in federal agency funding, providing accountability to the public, state, and federal governments, and improving education through self-study, visiting team evaluation, and agency follow-up.

Other models have been proposed for institutional self-study and evaluation in Europe. Many European educators in higher education have contributed to this literature on institutional evaluation and self-study and a wide variety of models have been proposed. Professor Alain Bienaymé of the University of Paris (1980) has developed a matrix of internal/external and micro/macro level data elements which provides multi-variable analysis to identify the typologies of institutions. Dr. Hans Löwbeer, Chancellor of the National Board of Universities and Colleges in Sweden (1980), proposed a multidimensional and nuanced model to study social equality, public service, culture, and welfare at the local and regional levels. Professor Jan Klyczynsky, Director of the Institute of Policy Studies, Technological Progress in Higher Education in Poland (1980), proposed a macro-regional planning model for higher education to integrate the university with the local community. Finally, Lyman Glenny, Professor of Higher Education at Berkeley, California, has edited a book on higher education in five countries of Europe (1979), in which case studies of Greece, Sweden, France, Spain and Italy are presented. Comparisons are made between these institutions and the United States in order to show how public confidence has been used as a measure of the ability of an institution to provide guidance in a changing world and to show how those institutions were able to adapt to change. A consistent finding of all this research is that a comprehensive multidimensional model is needed to study higher education both in Europe and in the United States. This paper attempts to address that need.

THE PROBLEM

Self-studies rest on the proposition that there is a correlation between internal characteristics and the quality of the educational output. This proposition raises the issue of how to measure both the characteristics and the output. These are critical questions for institutional researchers not only because of their direct involvement in data collection for self-studies, but also for the basic models used to analyze data in other investigations conducted by institutional researchers.

The traditional measures used are "qualitative" subjective measures based upon the collective judgements of the members of a visiting team. Some people have suggested that the newer uses of accreditation self-study data for purposes of funding eligibility, accountability, and educational improvement require a more quantitative analysis and more quantitative models for the analysis. While not discounting the value of quantitative models, this paper focuses on a mathematical qualitative model to add rigor to subjective evaluations.

PURPOSE

The purpose of this paper is to provide a qualitative model for use in institutional self-studies. The paper will describe the factor structure of variables involved in public confidence in higher education, the adaptive nature of administration, and the guidance externally active faculty members can provide in a changing world.

THE QUALITATIVE MODEL

Traditional self-study models are designed to determine the degree to which an institution is in compliance with standards established for the administration, educational program, faculty, library, physical plant, graduate program, and research of an institution of higher education. Institutional researchers who collect data for these self-studies attempt to document the ways in which the institution has adapted its behavior to these standards. This model is not well suited to many European universities because some of these universities have a potential to provide guidance to the society in a changing world. The model is designed to go beyond the traditional compliance-to-standards model and to show the dynamics of administrative adaptation and academic guidance. . (See Figure 1.)

In this model, public confidence is the dependent (state) variable, x, and there are four independent (control) variables as follows:

a = Activity (faculty influence on government and industry)

b = Output (degrees related to manpower needs)

c = Performance (effectiveness of graduates in jobs)

d = Time (staying power of public attention)

Hypothesis 1 - The system can be modelled around a singularity in a gradient-like dynamical system using the dependent (state) variable of public confidence and using the independent (control) variables of activity output, performance and time.

Rationale - Let x = Public Policy

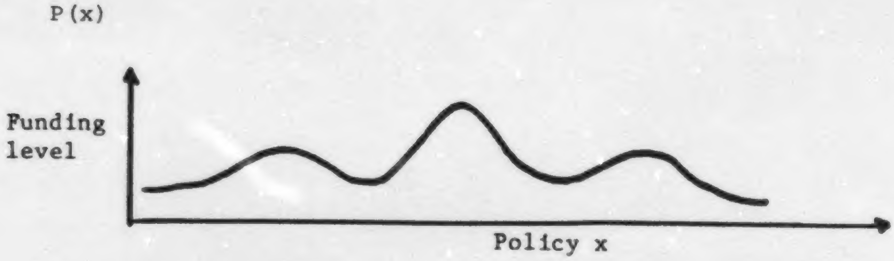
P(x) = Funding Level

a = External Faculty Activity

b = Output (of graduates with a right to an education)

c = Performance (of proven economic advantage)

d = Time (of changes in the attention)



A QUALITATIVE SELF-STUDY MODEL

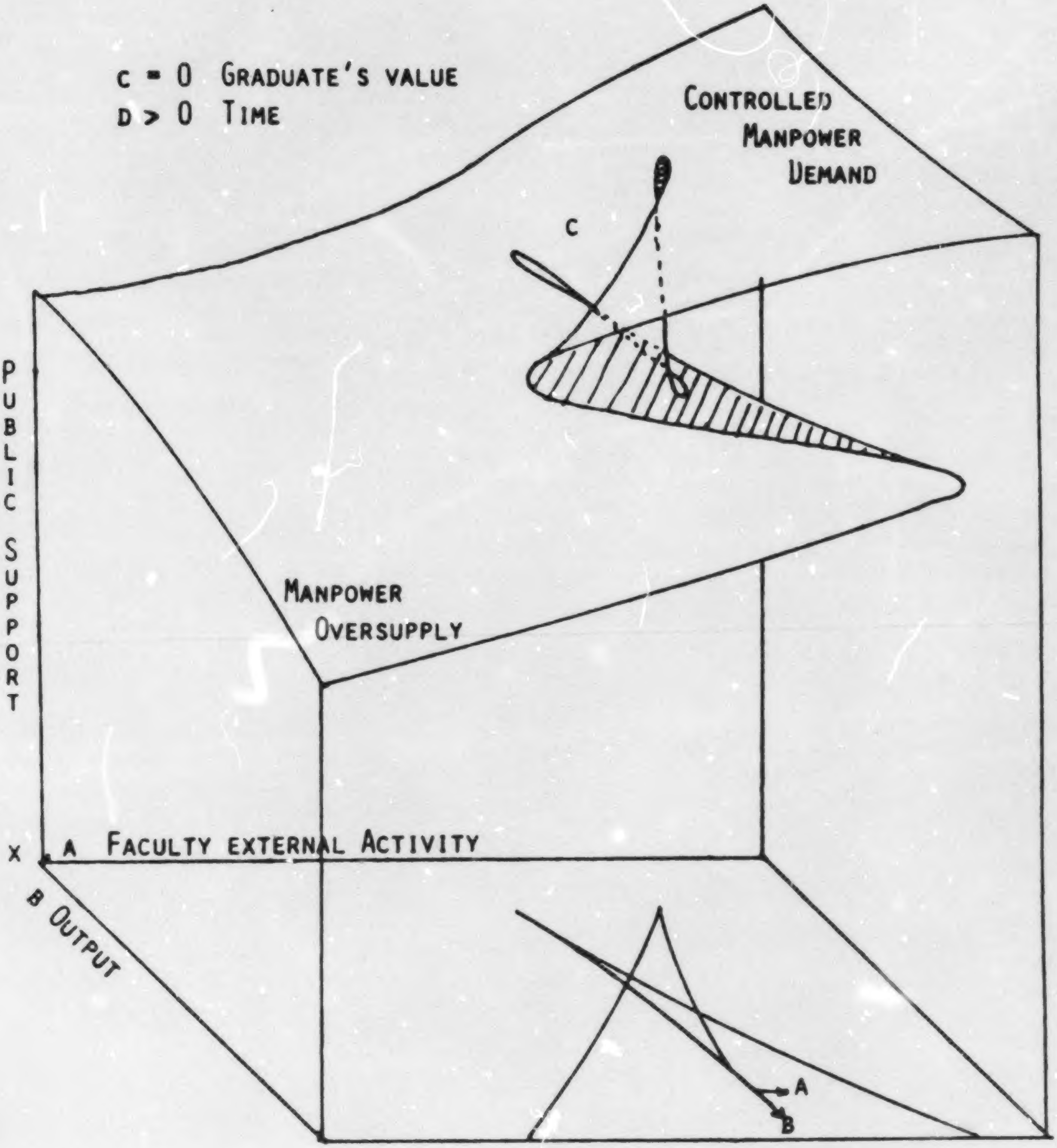

C = 0 Graduate's value
D > 0 Time
Controlled
Manpower
Demand
C
Public Support
Manpower
Oversupply
X
A Faculty external Activity
B Output
A
B

Figure 1

The public policy toward higher education is based on some combination of a) support for free choice of education for all students, b) support for manpower needs, c) support for proven performance showing an economic advantage to the society, or d) support at a time when attention is focused on the problem.

Hypothesis 2 - High faculty external activity yields high public confidence.

Rationale - When faculty members are active externally (legislature, corporate boards) they are able to control the demand for trained manpower and when they occupy chairs of power in the university they can control the supply of trained manpower. The degree to which they are able to do both produces a manpower need which will be funded at a level higher than the rate of inflation.

Hypothesis 3 - Free student choice of major lowers public confidence.

Rationale - The public is willing to support higher education if there is an economic advantage. If trained manpower is needed to create this advantage, funding will be provided at a level higher than the inflation rate. If an oversupply of manpower exists, then funding levels will drop below the level of inflation.

Hypothesis 4 - Graduates in the job market who demonstrate economic advantage can increase public confidence.

Rationale - The public can be increasingly convinced that liberal arts, non-job-related degree graduates can perform a useful function in society as found in the following examples:

Inspire the poor to raise their self-esteem and to break out of poverty.

Adjust personal performance to change and avoid job obsolescence.

Create new markets for products and services.

Hypothesis 5 - Time alters the distribution of public policy.

Rationale - As time passes, the public may grow weary of the issue and the opportunity to adjust attitudes may disappear. An agressive program is most likely to be effective when the performance, c, is strong and the public attention is focused for a time, d. The model depicts a time, d, set at zero because it is a time when an adjustment based on performance, c, can begin.

The data elements associated with each of the variables are the following:

x-Public Confidence

Appropriations above, at, or below inflation.

a-External Faculty Activity

Percent of faculty in legislative or corporate board seats.
Percent of faculty time assigned to the university.
Faculty control in filling new positions.
Availability of data base within the institution.

Percent of research funds allocated to junior faculty.
Percent of faculty responsible for curriculum.

b-Output

Ratio of technical and professional graduates to manpower demands.
Degrees of freedom of major choice by students.
Responsibility between students and the public for job placement.
Public perception of future technical manpower needs.

c-Performance

Proportion of liberal arts and technical professional degrees to total degrees.
Public perception of economic utility of liberal arts degree.

d-Time

Intensity of public attention focused upon the problem.
Duration of public attention.

To use the model, the institutional researcher needs to collect data on the state variable over some time period, construct scales for the dependent variables a, b, c, and relate the effect of d to the other variables. If the relationships, as hypothesized, hold, the effect of faculty activity, output, performance, and time can be studied and the ability of the institution to adapt or guide can be estimated.

While these estimates are to be made by the members of a visiting team similar to a traditional self-study, the focus of the study is on the whole relationship of the institution to the society and not just the ability of the institution to conform to the society. The model itself provides mathematical rigor to the qualitative issues involved and suggests possible scales and relationships among those scales based on a gradient like dynamical systems. The technical details for how this butterfly catastrophe model works can be found in Zeeman, 1977. The practical effect is to open the possibility for a clearer understanding of the role of the university in a changing society.

SUMMARY AND CONCLUSIONS

Data for this model come from case studies presented by Glenny "A Survey of Data Availability in Europe" and from interviews conducted for this paper with higher education authorities in England, France, Italy, Greece and the United States.

The approach of this study was to describe four factors to measure the degree to which a university maintains public confidence. Financial support is used to measure degrees of public confidence on a scale of the supply of trained manpower in occupations which give the economy and/or society a growth potential and on a scale showing the public support for educating ordinary citizens in the liberal arts tradition. Scales which show the activity of the professors within the society and the administrative control of decisions within the institution are constrained by the availability of data about the organization and operation of the institution. These variables are combined to form a qualitative model which can be used to study the ability of an institution to adapt to and provide guidance within a changing world.

Institutional researchers in general and Europeans in particular will be able to collect and analyze internal/external data at micro/macro levels. They will be able to sharpen their ability to improve public confidence and increase public support in the face of declining enrollment and adverse economic conditions. Given the current economic destabilization conditions, after a vast period of expansion in higher education, public pressure has risen for higher education to adapt to reduced funding and to provide society with guidance under changing economic conditions. The qualitative model presented in this paper can help institutional researchers to measure the potential their institutions have to be either an active force or to adapt passively.

THE ESSENTIAL NATURE OF AN INSTITUTIONAL SELF-STUDY

1. WHAT ARE THIS INSTITUTION'S *OBJECTIVES* AND WHAT OBLIGATIONS DOES IT HAVE?
2. ARE THE *OBJECTIVES APPROPRIATE*? NOW? HERE? FOR ITS CONSTITUENCY?
3. ARE ALL THE INSTITUTION'S *ACTIVITIES CONSISTENT* WITH ITS OBJECTIVES?
4. ARE THE PROGRAMS AND ACTIVITIES *DESIGNED TO ACHIEVE THE OBJECTIVES?*
5. ARE THE *RESOURCES AVAILABLE* TO CARRY OUT THE PROGRAMS? WILL THEY CONTINUE TO BE AVAILABLE?
6. IS THERE REASON TO BELIEVE THE *OBJECTIVES* ARE BEING ACHIEVED? WHAT IS THE EVIDENCE?

THE EVALUATION PROCESS

1. THE INSTITUTION LOOKS AT ITSELF AND SPEAKS TO THE COMMISSION VIA *SELF-STUDY*.
2. PEERS GIVE EVALUATION AND ADVICE VIA THE *EVALUATION REPORT*.
3. THE *INSTITUTION RESPONDS* TO THE TEAM REPORT THROUGH A DIRECT COMMUNICATION TO THE COMMISSION.
4. THE *COMMISSION ACTS* ON THE BASIS OF THE INFORMATION GAINED IN THE FIRST THREE STEPS.
5. THE INSTITUTION *CONTINUES TO CONSIDER* AND ACT ON THE RESULTS OF ITS OWN SELF-STUDY AND THE ADVICE IT HAS RECEIVED.

THE PRIMARY EMPHASIS OF ALL COMMISSION ACTIVITIES IS ON STRENGTHENING INSTITUTIONS.

THE COMMISSION TRIES TO *DE*-EMPHASIZE ACCREDITATION PER SE, WHILE AT THE SAME TIME PROVIDING NECESSARY ACCOUNTABILITY.

THE COMMISSION USES QUALITATIVE (NOT QUANTITATIVE) EVALUATION IN TERMS OF AN INSTITUTION'S OWN OBJECTIVES.

THE COMMISSION IS NOT A STANDARDIZING AGENCY AND DOES NOT EMPLOY INSTITUTIONAL COMPARISONS.

THE COMMISSION ACTIVELY SUPPORTS INNOVATION.

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STATEWIDE SYSTEM FOR ASSESSMENT OF INSTITUTIONAL BASIC SKILLS PROGRAMS

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and

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PURPOSE

The purpose of this paper is to describe the process used and problems encountered in developing the state "Guidelines for Preparation of Institutional Report on Remedial Program Effectiveness," describe the Guidelines and the rationale behind them, and to present findings from the first round of institutional reports based on the Guidelines.

HISTORICAL BACKGROUND

In a recent survey of two-year colleges in the country, it was found that nearly 98 percent of the responding colleges offered remedial courses in basic skills, and 80 percent of them had a developmental or remedial skills center.[1] However, two-year colleges are not alone in facing the need of providing remedial help to their entering freshmen. Data collected on four-year state colleges in New Jersey, for example, indicates that of the students entering these colleges in Fall 1981, 22 percent lacked proficiency in verbal area (reading and writing), 33 percent lacked proficiency in computational skills, while 50 percent were not proficient in elementary (high school level) algebra. Even at a selective institution, such as the Rutgers University, 9 percent of the entering students lacked proficiency in verbal skills, 15 percent in computation, and 19 percent in elementary algebra.[2] Institutions of higher education throughout the country are facing similar problems.

It is beyond the scope of this paper to discuss the reasons for this problem. Briefly, some of the major explanations offered are as follows. A leading explanation is that with the decline in the number of 18-year to 24-year-old persons in the United States, and as an impact of the women's liberation movement, colleges and universities in the country are enrolling increasing proportion of so-called nontraditional students, namely, older men and women, and students coming from disadvantaged economic and social backgrounds who generally are first in their family to attend a college. Another reason offered is that increasing number of students are enrolling in college who never graduated from high school but instead earned a high school equivalency diploma by passing the G.E.D. (General Education Diploma) tests. Moreover, it is said that as indicated by the declining national and state means on the Scholastic Aptitude Test (SAT), the academic preparation of the high school graduates as a whole has gone down.

While the problem of academic-skills-deficient students enrolling in colleges has existed for several years, there was no statewide effort in New Jersey until 1978 to gauge the dimensions of this problem, and to do something about it. In order to find out how the colleges were coping with this problem, a survey of all public colleges in the state was conducted by the Department of Higher Education in 1976. The survey confirmed the general feeling that, except in a few colleges, there was no systematic testing of incoming students, and while remedial courses in verbal or mathematical skills were offered by several colleges, enrollment in them was mostly voluntary on the part of students.

Realizing the gravity of the situation, the state Board of Higher Education appointed a high-powered task force under the chairmanship of the president of Rutgers, the State University, to study the situation and make appropriate recommendations for action. The task force, with the help of a Technical Advisory Committee of which the principal author of this paper was a member, recommended in 1977 the development and implementation of a statewide basic skills testing program. It also recommended the formation of a body, which came to be called New Jersey Basic Skills Council, to develop appropriate basic skills tests and necessary statewide policies, and with the help of the Department of Higher Education to implement a statewide testing and placement program.

The Council consisting of representative members from two-year and four-year colleges, as well as from the Rutgers University, appointed three subcommittees on Reading and Writing, Mathematics, and on Test and Measurement respectively to help in discharging its functions. The two subject area committees focused on the skills to be measured by the test, while the Test and Measurement Committee dealt with the psychometric qualities of the test. The actual task of developing the tests was awarded to the Educational Testing Service (ETS), the well-known testing organization in the country.

The test development process culminated in the development of the following six tests:

1. Reading Comprehension Test: A test of reading skills, consisting of 40 multiple choice items, distributed in 3 clusters; Understanding Main Idea, Understanding Direct Statement, and Drawing Inference.

2. Sentence Structure Test: A test of writing skills, consisting of 35 multiple choice questions divided in three clusters; Using Complete Sentences, Using Coordination and Subordination, Placing Modifiers.

3. Essay: A 20 minute writing sample obtained from students and assessed through an elaborate procedure developed by the ETS called 'holistic' scoring.

4. Logical Relationships Test: A test of logical thinking, consisting of 50 multiple choice items divided in four clusters; Categorizing Ideas, Using Appropriate Connectives, Making Analogies, and Recognizing Principles of Organization.

5. Math Computation Test: A test of computational skills consisting of 30 items. The questions cover operations with whole numbers, fractions, decimals and percents, and with arithmetic reasoning.

6. Elementary Algebra Test: Consisting of 30 items dealing with operations with real numbers, algebraic expressions, and solving equations, inequalities, and word problems.

Recently, as a result of the research conducted on the test data, the Logical Relationships test has been eliminated, but some of its items have been included in the Reading Comprehension test, resulting in increasing the number of items on the latter test from 40 to 50. Also, with the experience of running the basic skills programs for the last three years, a general consensus has grown that the reading, writing, and mathematical skills cannot be remediated as discretely separate skills, when underlying all of these skills are the thinking skills. In view of this, a new subcommittee on Thinking Skills has been appointed to review the data and information available in this area, and make appropriate recommendations for testing, and remedial instruction in the area.

The first mandated testing of freshmen enrolling in all public colleges in the state took place in fall 1978. Institutions used the results to set minimum standards in different areas of basic skills, formulated appropriate placement policies, and organized either preexisting or newly created courses to provide remedial instruction to those falling short of the minimum levels set.

Since 1978, more than a quarter million students have been tested. New forms of tests are developed each year to maintain security and to improve them. The new forms are equated from year to year and the results are reported in standard scores so that the test results can be compared over time.

In order to monitor institutional testing and placement policies and their results, and in order to make sure that the state mandate was being carried out as intended, the Basic Skills Council developed an annual questionnaire to be filed by each institution. This questionnaire provides information on the number of students tested, identified for remediation, and actually enrolled in remedial courses. It also describes the placement policies, placement criteria, and time allowed to students to remediate. The progress made by institutions in testing and remediating their freshmen since 1978 is shown in Tables 1 and 2.

TABLE 1

PROGRESS MADE BY COLLEGES IN THE STATE IN TESTING THEIR FRESHMEN AND IN ENROLLING SKILLS-DEFICIENT STUDENTS IN REMEDIAL COURSES

	Percent of freshmen tested %	Percent of those needing remediation enrolled in appropriate remedial course in: Reading %	Writing %	Math[1] %
Fall 1978	73	56	78	
Fall 1979	86	64	84	
Fall 1980	89	77	90	
Fall 1981	91	77	83	

[1] There is no consistent policy regarding remediation in mathematics. The two areas of math computation and elementary algebra are treated by some colleges in an integrated manner while separately by others. In view of this, it was not possible to summarize the data in this area.

TABLE 2

PROGRESS MADE BY COLLEGES IN THE STATE IN RAISING MINIMUM LEVELS OF SKILLS REQUIRED OF THEIR STUDENTS

	Median cut-off scores[1] on tests of					
	Reading		Writing		Math Computation	
	two-year colleges	four-year colleges	two-year colleges	four-year colleges	two-year colleges	four-year colleges
Fall 1978	159	165[2]	157	164	158	162
Fall 1979	160	166	160	164.5	161	169.5
Fall 1980	160	167.5	160	163	161	167.5
Fall 1981	163	165	160.5	164	162.5	165.5

[1] Students scoring at or below these scores are required to take remediation.

[2] The four-year colleges being selective in their admissions had generally set the cut-off scores high and through the years have either maintained them or as in the case of math computation adjusted them downward. Two-year colleges being committed to open admissions started with comparatively low scores which have been adjusted upward through the years.

DEVELOPMENT OF GUIDELINES

Having invested a substantial amount of resources in test development and funding remedial instruction, and having allowed the institutions to develop and refine their placement and remedial programs for two to three years, the state was eager to know to what extent the institutions had succeeded in upgrading the basic skills of deficient students and in helping them to succeed in college.

The Basic Skills Council appointed a statewide Assessment Committee in 1980 to develop appropriate guidelines for institutions to assess the effectiveness of their basic skills programs and to report the data on program assessment to the state. The Committee was composed of faculty members and researchers from different institutions in the state.

While there is no dearth of literature and studies on program evaluation, studies on statewide systems of basic skills program evaluation are hard to find. A quick search of literature revealed only one study which is descriptive in nature and confined to community collegesoonly.[3] The fact that the state guidelines had to be uniformly implemented by colleges with different types of students, curriculums, and institutional goals, put some obvious limitations on what the guidelines could ask for and the extent to which they could go. Hence, the members of the Assessment Committee had to use their wits and judgments to pick and choose from various evaluative designs, and reach a consensus on the elements to be incorporated in the guidelines.

However, before reaching a consensus, the Committee spent quite a few brainstorming sessions in deciding who needed the information on the effectiveness of basic skills programs, why the information was needed, what were the primary objectives of the remedial programs, and what should be the objectives of the assessment program. The following represents the outcomes of these discussions:

1. Who Needs Information: The department and Board of Higher Education as well as the governing board, management, and faculty of each institution.

2. Why the Information was Needed: To find out whether the basic skills programs and the resources spent on them were resulting in benefits to the students.

3. Basic Skills Model: While there was agreement on basic skills being an essential part of general education, i.e., that all college graduates must possess reading, writing, and mathematical skills at certain minimal levels, it was also agreed that the immediate purpose of remedial programs was to upgrade the basic skills of skills-deficient students to levels necessary for them to cope successfully with their college work, i.e., the courses required of them.

4. Evaluation Model: While the institutions could and, in fact, were encouraged to conduct more detailed formative assessments to provide information for improvements of their programs, the state guidelines had to focus on summative information to assess overall program effectiveness of institutional programs. Also, while the institutions were free to try innovative, qualitative and complex evaluative designs, the guidelines had to rely on quantitative data which could be easily gathered, and on comparatively simple data analytical procedures.

   In addition, in view of the difficulty of enforcing a rigorous research design, such as experimental/control groups pre-test and post-test design, the guidelines had to rely on multiple indicators to assess the overall success of the remedial programs. Moreover, multiple indicators were likely to provide information on different aspects of the remedial program which could not be obtained through the use of only one particular design.

THE GUIDELINES

"The Guidelines for the Preparation of Institutional Report on Remedial Program Effectiveness" aim basically at two major objectives. First, evaluation of the effectiveness of remedial instruction in upgrading the skills-deficient students on the basis of their performance in the remedial course and on pre-test and post-test. Secondly, assessing the impact of remediation or the lack of it on the post-remedial performance of students. It was expected that this part of the Guidelines could answer critical questions such as 'to what extent are students helped by the remedial program,' and 'what would happen if there was no remedial program?'

Besides the data on the effectiveness of remedial programs, the Guidelines also seek information on the history of the program, on placement policies and procedures, on remedial courses, staffing of courses, support services, and on placement criteria, particularly how the criteria are set and validated.

The first part of the results section in the Guidelines deals with the data on how many students were tested, how many were identified by the institution as lacking skills in each of the four areas (reading, writing, math computation, and elementary algebra), how many of these students actually enrolled in remedial courses and how many of them passed them.

EFFECTIVENESS OF REMEDIAL INSTRUCTION

As it would have been inadvisable for the state to direct institutions to deny remedial instruction to a group of students in order to obtain a control group, the use of the control/experimental groups pre-test and post-test design was not considered feasible to include in the Guidelines. After a long debate, the best alternative that could be agreed upon was a single group pre-test and post-test design. The problems associated with this design are too well known to be enumerated here. A detailed discussion of the design can be found in Campbell & Stanley (1963) and Cook & Campbell (1979). In order to make sure that the institutional users were aware of the limitations of this design and to suggest some corrective measures to alleviate some of the problems associated with the design, a "Non-Technical Paper on the Use of a Single Group Pre-test and Post-test Design in the Evaluation of the Effectiveness of Remedial Instruction," was prepared and sent to the institutions with the Guidelines. The procedures to be used in analyzing and reporting the data resulting from the use of this design are also described in this paper.

Two key pieces of information resulted from the use of the pre-test and post-test design. First, the differences in the means of pre-test and post-test scores and their significance levels were reported for each of the remedial courses. The mean differences were also expressed in terms of standard deviation units to get a better understanding of the size of the differences.

Secondly, the institutions were asked to report the percentage of students who scored on the post-test at or above the minimum level used for placing these students in the remedial course. The minimum level on the post-test score would be equivalent to the cut-off score on the pre-test if pre-test was used as a placement instrument.

IMPACT OF REMEDIATION OR LACK OF IT ON POST-REMEDIAL PERFORMANCE OF STUDENTS

A longitudinal cohort follow-up design was used to assess the impact of remedial programs on students. All tested students were divided into the following four cohorts:

A) Students who did not need recommendation, i.e., they were found to have the minimum level of skills identified by the institution as necessary for successfully dealing with their college-level courses.

B) Students who needed remediation and successfully completed it.

C) Students who needed remediation but who did not enroll in the specified remedial course.

D) Students needing remediation who enrolled in the remedial course but did not pass it.

The four cohorts defined above were compared on the following three criteria relating to their performance in the second semester.

(i) Overall persistence: Number and percent returning in the second semester as full-time, part-time, or not returning.

(ii) GPA: Grade point average based on second semester college-level courses only. This could be indicative of the quality of performance of those who persisted.

(iii) Course Completion: Ratio between college-level credits attempted and earned in the second semester.

In order to assess the impact of remediation on performance of students in specific skills-related courses, institutions were asked to compare the passing grades in these courses of the following groups of students who were enrolled in them.

A) Students who did not need remediation.

B) Students who needed remediation and who completed it before enrolling in the college-level course.

C) Students who needed remediation but who did not complete it before enrolling in the criterion course.

The Guidelines were finalized and sent to the institutions for their review and feedback. Surprisingly, no serious objections were raised against the Guidelines. Minor changes were suggested and they were incorporated in the Guidelines. After approval by the Basic Skills Council and the Department of Higher Education, the Guidelines were sent by the Chancellor of Higher Education to the Presidents of all of the public colleges for implementation.

In order to clarify the Guidelines and facilitate a uniform implementation of them, a workshop was organized for the representatives of different institutions who had been assigned the responsibility of writing the effectiveness reports.

RESULTS

1982 is the first year when the institutions have had to follow the detailed state Guidelines. Despite the fact that July 15, 1982 was the deadline for submitting these reports, not many reports had been submitted by that date. Even those submitted did not have complete data. In view of this and in view of the fact that it will be beyond the scope of this paper to summarize data from 30 different institutions, it has been decided to present some hypothetical data, which, although it does not belong to any one college, reflects the trend in the data reported by different colleges. As this paper is not concerned with identifying any particular institutions whose data reflects an effective or comparatively ineffective program, but rather is concerned with the problem of how to use and interpret the data obtained on the basis of the Guidelines, the data presented here should be sufficient for this purpose.

TESTING AND PLACEMENT OF STUDENTS

Table 3 presents data on the percent of entering freshmen tested, the percent of tested students who were found in need of remediation in the four basic skills areas, the percent of these students who actually enrolled in the appropriate remedial courses within a year, and the percent of the enrolled students who passed the respective remedial courses.

TABLE 3

PERCENT OF ENTERING FRESHMEN TESTED, FOUND IN NEED OF REMEDIATION, ENROLLED AND PASSING THE REMEDIAL COURSES IN THE FOUR BASIC SKILLS AREAS

	Tested %[1]	Needed Remediation %[2]	Enrolled in Remedial Course %[3]	Passed Remedial Course %[4]
Reading	95	30	84	62
Writing	95	30	89	54
Math Computation	95	27	80	58
Elementary Algebra	95	26 (46)[5]	71	60

[1] % of entering students

[2] % of those tested

[3] % of those identified for remediation

[4] % of those enrolled in course

[5] Many colleges require remediation in algebra only for students enrolling in programs with math requirements. The percentage in the parentheses would result if placement criteria were to be applied to all tested students, as in the case of other skill areas, irrespective of their curriculum.

As was shown in Table 1, in the last four years, the percent of students tested out of those who were required to be tested has gone up from 73 percent in 1978 to 91 percent in 1981. Many colleges, however, are still not able to test all of their students. This problem is particularly acute in the case of part-time students enrolling in two-year colleges because many of these students register and enroll immediately before the beginning of classes, and sometimes even after the classes have started. The problem is well recognized and efforts are being made to change the testing policy in order to resolve this problem.

While the testing policy is uniform for the whole state, there is no such uniformity in regard to the placement criteria on the basis of which students are identified for remediation. Institutions, in consultation with their faculty, set their own criteria. However, with the persistent efforts made by the Basic Skills Council, the variations among the colleges, particularly between the two-year colleges and four-year colleges, are being reduced as shown in Table 2.

As Table 3 indicates, identification of students needing remediation in algebra poses special problems. Many colleges, particularly two-year colleges, are not convinced that algebra is an essential skill which like reading, writing, or math computation should be required of all students. The issue is being currently debated and efforts are underway to reach a consensus regarding a statewide policy.

Even though most colleges by now require that students identified for remediation must enroll in a specified remedial course within a reasonable time, not all the students enroll in these courses. The enrollment rate is generally between 70 percent and 90 percent. Follow-up data shows that most of the students who do not enroll in the required remedial course within a year do not last in the college.

There is no uniform policy in regard to which college courses can or cannot be taken by students who have not yet completed remediation. Follow-up of students who completed and those who did not complete remediation in specific college-level courses shows that students without remediation do not do as well as those who have completed remediation. As such evidence accumulates, pressure is likely to build for keeping the remedial students out of many college-level courses till they have completed remediation.

Passing rates in remedial courses vary from institution to institution, and can be a good indication of the appropriateness of the course for the level of remedial students. A higher failure rate in the remedial course generally indicates that the time allowed and the level of instruction used for low ability students enrolled in the course are not appropriate. The needs of these low ability students may be better served by either a lower level course preceding the given course or by more instructional time and more instructional help through tutors or skills labs.

PRE-TEST AND POST-TEST RESULTS

Table 4 presents typical results obtained from the use of pre-test and post-test design. The difference between post-test and pre-test mean score is always positive and generally substantial. If one were to depend solely on these mean score differences, most remedial courses would appear to be effective. However, a much more relevant statistic is the percentage of students who scored at or above the minimum level on the post-test. Unless scores on the post-test are used as the passing criterion for the course, not all the students passing the course score at or above the minimum level on the post-test. However, before any valid conclusions can be drawn from this, it has to be made sure that there is a close match between the post-test and the curriculum objectives of the remedial course.

COMPARISON OF COHORTS

The data on the comparison of the four cohort groups is presented in Table 5. Of all the results, this provides the most interesting and revealing information. Whatever the post-test gains of the remediated students, the real test of the effectiveness and usefulness of remediation is in comparing the college performance of the remediated students with the performance of those who did not complete remediation on the other hand. The comparison group data which is so much missed in the single group pre-test/post-test design becomes at last the focus of this design. Also, by using three different criteria of successful performance, the reliability of the findings is enhanced.

TABLE 4

RESULTS OF PRE- AND POST-TESTING OF STUDENTS
COMPLETING[1] THE RESPECTIVE REMEDIAL COURSES

	Pre-test Mean	Post-test Mean	Improvement in terms of:		t-value & level of significance	% of students scoring at or above the minimum level on the post-test[1]
			Mean Score	S.D.		
Reading	150.0	160.0	10	1.3	9.48*	74%
Writing	154.0	165.0	11.0	1.4	10.4*	83%
Math Computation	156.0	170.0	14.0	1.8	12.8*	92%

* Two-tailed p. $\leq$ .001

[1] Post-tests could be given only to those students who persisted in the course till the end. Thus, it excludes those who enrolled in the course but did not complete it.

As Table 5 shows, and the data presented reflects the trend of data actually reported, students completing remediation showed the highest persistence rate of all the groups. However, the remediated students have a built-in advantage here. Students who enroll in remedial courses but who either drop out of the course or college, or fail in the course, are transferred by the very definition of the groups to the third group. This advantage is not available to either group one (not needing remediation) or group four (needing remediation but not enrolled in the remedial course). In view of this, the higher persistence rate for the remedial versus those who did not need remediation in the first place needs to be discounted. Still, it can be claimed that remediated students show a persistence rate similar, if not higher, than those who did not need remediation.

The next two criteria provide a more equitable basis for comparison of the four groups. On these variables, as could be expected, students who did not need remediation showed the best performance followed by those who completed remediation and closely followed by those who did not enroll in the remedial course. The latter finding needs some explanation. As the persistence data shows, only 35 percent of those who did not enroll in the remedial course returned for the second semester. These 35 percent were obviously a select group who somehow felt, despite the test results, that they could do without remediation. The results show that they were probably right. This may mean that the level of skills they possess were either not truly indicated by their test scores (as they might have missed the cut-off only by a few score points) or that even though their level of skills were lower than the proficiency level set by the institution, in practice, they were able to negotiate successfully with the college-level courses. This may raise questions in regard to the level of skills required to succeed in those courses.

TABLE 5

RESULTS[1] OF COHORT COMPARISONS FOR STUDENTS NEEDING OR NOT NEEDING REMEDIATION IN READING

	Returned as full-time %	GPA of 2.0 or above[2] %	% of attempted credits completed %
1. Did not need remediation	76	73	82
2. Needed remediation and completed it	85	62	71
3. Needed remediation, but failed remedial course	57	32	45
4. Needed remediation but did not enroll in remedial course	35	55	65

[1] Results are based on data pertaining to the 2nd semester.

[2] GPA based on college-level courses only. A GPA of 2.0 or above generally represents acceptable level of work for undergraduate students.

CONCLUSION

There was a tremendous amount of opposition, skepticism, and anxiety among the institutions when the statewide testing program was introduced in 1978. It was seen as an encroachment on the institutional freedom and independence. However, by the time the statewide system of basic skills program evaluation based on state guidelines was introduced, it was quietly accepted despite the fact that it probably represented a greater encroachment on the institutional independence. Having lived with the testing program for 3 to 4 years, institutions not only appear to be resigned to the basic skills program, but many of them now realize the benefits that have accrued to students due to the program.

In summary, the New Jersey Basic Skills Assessment Program has resulted, or is likely to result, in the following benefits:

1. Allowing institutions to review and evaluate their basic skills programs, which may or may not have happened without the state program. This will result in providing the necessary information for the improvement of these programs.

2. Provide results from different institutions for comparison purposes. Institutions will be able to assess whether their attrition rates, passing rates, or grade distributions are reasonable or not.

3. With the availability of information on what works and what does not work, discarding of poor procedures and spreading of good procedures would take place at a faster pace.

4. Once the institutions are set up to evaluate one program, they may find it easier to conduct similar evaluations of other programs, resulting in the availability of useful information on other programs. The general awareness and familiarity with program evaluation methodology has already increased among the administrators of these institutions.

5. The availability of longitudinal data on the basic skills proficiencies of freshmen entering different institutions in the state will prove very useful in planning both at the state and at institutional levels.

6. Finally, the availability of follow-up data on the performance of different groups of students in the college is likely to lead to asking of some hard questions regarding institutional goals and allocation of resources. Some institutions may see remedial programs as a means of salvaging students who would otherwise be lost, or in order to make up for declining enrollments. On the other hand, other institutions may see remedial programs as consumers of valuable resources and not worth the cost.

REFERENCE NOTES

1. The survey was conducted by Monroe County Community College in Michigan. This data comes from a personal communication from Dr. Ronald Campbell, President of the College.

2. New Jersey Basic Skills Council, "Report to the Board of Higher Education on the Results of the New Jersey College Basic Skills Placement Testing and Recommendations on Instruction and Curriculum Development," January 22, 1982.

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4. Campbell, Donald T. and Stanley, Julian. Experimental and Quasi-Experimental Designs for Research. Chicago: Rand McNally, 1963.

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ABSTRACTS OF ADDITIONAL CONTRIBUTED PAPERS

CONFLICTING DEMANDS FOR CONTROL OF A UNIVERSITY'S PUBLIC RADIO STATION - CASE STUDY

A. Nancy Avakian, Assistant Vice Chancellor
University of Missouri - St. Louis

A university cites a four-point mission for its 100 000 watt public radio station: 1) teaching students broadcasting; 2) teaching regular courses; 3) providing continuing education to special groups such as pharmacists; and, 4) performing a public service to the community. Students, faculty administrators, and community leaders hold conflicting perceptions of the station which has become the fine arts station in a major metropolitan area. How can a university fulfil its educational obligations without alienating its major contributors?

The results of this case study have far-reaching implications for all universities in areas such as sports, child care centers, or use of university research centers.

TEACHER EDUCATION AT A DISTANCE DESIGNED FOR MEMBERS OF THE CARING PROFESSIONS

Marianne Kjellman, Tutor/Lecturer
Uppsala University
John Davies, Research Student
Uppsala University

The target group comprises members of the nursing and para-medical professions. Duration of the programme is sixteen weeks (three academic terms - twenty weeks per term).

In this particular programme thirty-seven registered nurses participated, commencing during the Autumn term 1980 and terminating the programme in December 1981.

The programme is organized as *distance education.* This implies that students study at their place of domicile and in small groups at nodal centres throughout the greater part of the programme, while limited periods are spent attending courses at Uppsala University.

Students follow a student's guide which describes and explains objectives while providing counsel for the realization of objectives. Information on reading matter and examination procedures is included.

A team of full-time tutors together with guest lecturers are assigned to the programme. Evaluation of the programme was completed in November 1981. The discussion will focus the attention on the experiences of how useful distance teaching is for training of teachers in the caring professions.

A HISTORICAL AND CONTEMPORARY EXAMINATION OF PRE-EXISTING CONDITIONS NECESSARY FOR AN INSTITUTION TO BE SUCCESSFUL IN ITS ENVIRONMENT

Robert G. Cope, Professor
University of Washington

Strategic planning builds upon geopolitical principles to present fundamental elements necessary for an entity to be successful in turbulent political and economic environments. The suggested principles include centers of distinctive strength, pivotal geographic, technological and value locations, and quality products give competitive advantage, while three additional principals give the entity the capacity to adapt: permeable boundaries, substructures with adaptive functions, and senior level encouragement to produce new programs. Thus the geopolitical elements, when given a Darwinistic interpretation, guide institutions to develop six strategic elements to ensure vitality.

CHANGES IN UNIVERSITY AUTONOMY IN DEMOCRATIC SPAIN

Alberto Moncada, Institutional Research Director
Universidad Complutense de Madrid

The purpose of the paper is to present the facts about the evolution of university governance in Spain from the centralized model to the autonomous ones in the context of Spanish political change.

Spanish universities were modernized in 1970 by a law which granted them a certain amount of power in the organization of corporate life and use of funds. Before that, universities were mere administrative offices of the Central Administration.

With the democratic regime, the legal status of the universities was addressed by a constitutional precept which, among other things, asked for a new law on university autonomy.

From 1976 until 1982 four Ministers of Education failed in fulfilling such a mandate.

The paper is intended to present the facts and provoke a certain amount of feedback from the Forum which could be useful for the domestic discussion in Spain.

THE CHANGING AMERICAN LEGAL SYSTEM AND ITS IMPACT ON AMERICAN UNIVERSITIES

Stephen R. Hample, Director of Institutional Research
Montana State University

Changes in the U.S. legal system are profoundly affecting U.S. universities. The number of lawsuits (often regarding "fair" treatment) filed by faculty, students, and others against universities has increased rapidly. Determining what is "fair" has suddenly involved university data and statistical analysis of that data. Institutional researchers (at least in the U.S.) must anticipate what types of data must be collected, how they should be analyzed, and (importantly) how statistical analyses can be explained to a judge.

This paper reviews this challenge to the universities, defines a new added role for institutional research, and calls for IR staff to share ideas and suggestions on how to best serve that role.

THE STAFF PRESIDENCY AND SHARED AUTHORITY: AN ALTERNATIVE ADMINISTRATIVE STRUCTURE FOR A COMPREHENSIVE UNIVERSITY

Richard A. Hartnett, Assistant Professor
West Virginia University
John Andes, Professor
West Virginia University

This study describes the implementation of a staff presidency model for maximizing shared authority in a major U.S. comprehsnsive university. The model, which featured only three levels of authority (president, deans/directors and departments), was assessed over a five year period of time at West Virginia University with respect to both its organizational effectiveness and efficiency.

Primary sources of data included focused interviews with staff presidency administrators and a survey questionnaire administered to all middle-level line administrators. Results of the study pointed to a considerable degree of efficiency with respect to access to the president by middle-level managers, a moderate degree of effectiveness in accomplishing major objectives, and differentiated perceptions concerning the role of the staff presidency administrators as perceived by academic deans versus directors of non-academic areas.

A METHODOLOGICAL APPROACH TO SELECTIVE CUTBACKS*

Charles H. Bélanger, Director of Institutional Research
Université de Montréal
Lise Tremblay, Research Associate
Université de Montréal

At times - when budget must be severely reduced on short notice and when sensible decisions must arise form complex situations - planners have to work out simple but reliable measures of resource allocation and reduction. This paper recognizes the need for applied research in this area and proposes a budget reduction formula that has the advantage of relating financial planning to program evaluation, faculty resources, and activity levels of departmental units. The tool developed is flexible, as it can be manipulated without endangering its basic assumptions to describe best each unit's intrinsic characteristics. Furthermore, its redistributive effects can be readily measured and made to respond to institutional priorities.

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INTERNATIONALIZING THE UNIVERSITIES

Susan Opper, University Researcher
Uppsala University

Higher education is generally assumed to encompass on international aspect. But is this really true? Viewed from an international perspective serious shortcomings may be detected in Swedish higher education curricula. This paper accounts for the background of the Swedish programme for internationalizing higher education, describes and attempts to assess the current methods to implement the programme, and presents a few suggestions to make internationalization a more integral part of undergraduate studies. Some discussion on why internationalization is desirable and what it means is included. Using Sweden as a case study may give a few suggestions and help avoid some pitfalls.

SMALL MANAGEMENT INFORMATION SYSTEMS FOR SMALL INSTITUTIONS

John R. Calvert, Senior Lecturer in Management Science
Loughborough University of Technology
D.W. Birch, Deputy Director
Further Education Staff College
Dudley Gibson, Assistant Director
Dorset Institute of Higher Education

A multi-institutional research team has set out to develop a microcomputer based management information system for colleges involved in post-compulsory education who have not access to mini or mainframe computers. The project is funded by the UK Department of Education and Science and is aimed at all colleges in the U.K.

PRESENT AND FUTURE FUNCTIONS OF HIGHER EDUCATION IN SOCIETY

Peter Stenkula, Senior Lecturer
University of Lund

For what purpose do we have higher education?

The author will set out from the traditional survey of higher education as investment in human capital, discussing how well this theoretical explanation helps us to find arguments for future higher education. Investment and consumption are very traditional ways of tackling economic problems.

Another way to look upon the educational system is to regard it as a system producing information signals about individuals. This survey takes us over to another theory of higher education and its functions, namely the role of screening.

The development of higher education will then be analyzed by looking at benefits to the interested parties of higher education: politicians, teachers and students.

The presentation will end up with some conclusions regarding the future function of higher education.